

# NAVAL POSTGRADUATE SCHOOL

## Monterey, California



## THESIS

**WEB-BASED NETWORK MANAGEMENT  
CONFIGURATION FOR THE INDONESIAN EASTERN  
FLEET WIDE AREA NETWORK**

by

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March 2001

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**WEB-BASED NETWORK MANAGEMENT CONFIGURATION FOR THE  
INDONESIAN EASTERN FLEET WIDE AREA NETWORK**

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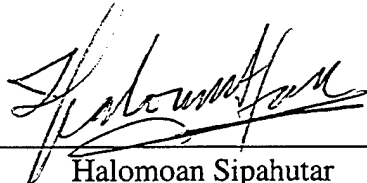
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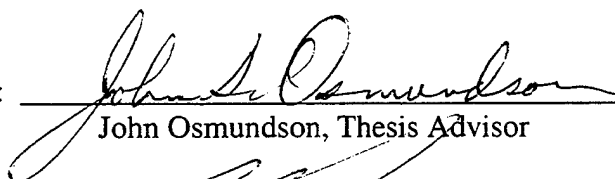
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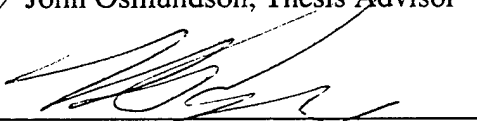
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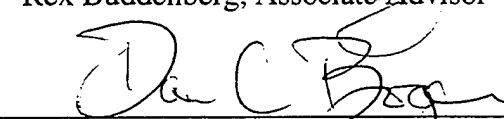
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## **ABSTRACT**

This thesis presents a model of an integrated wide area network using web-based network management to support fleet operations of the Indonesian Eastern Fleet. It surveys possibilities for improving the Indonesian Eastern Fleet's computer communications network systems to provide a fast, reliable, and effective way of gathering and distributing information to all fleet units. A standardized LAN infrastructure and the use of an appropriate network hardware and software was recommended to achieve connectivity of all main naval base LANs in an integrated WAN. This thesis provides a design of the Indonesian Eastern Fleet WAN that was tested using a leading edge simulation tool, EXTENDv4. A feasible sized WAN communication architecture was modeled utilizing scaling techniques, which simulated the operation of the Indonesian Eastern Fleet WAN that linked six Fast Ethernet LANs configuration in a one worksheet PC wide screen. A reliable wide area network design using ISDN 128 Kbps and T1 line 1.544 Mbps has been proved in this thesis by executing tests and simulation runs using EXTENDv4 software simulation program.

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## **I. INTRODUCTION**

### **A. BACKGROUND**

The Indonesian Navy consists of integrated weapon systems that include warships, aircraft, naval bases and Marines. The responsibility of the Indonesian Navy is vast, and encompasses 17,506 Indonesian islands widely scattered from west to east. Indonesia has 1,222,466 square miles of sea area and 782,665 square miles of land area inside the unified archipelago country. The Indonesian Navy has two fleets: the Indonesian Western Fleet, responsible for the western region of Indonesia's sea territory, and the Indonesian Eastern Fleet, responsible for the eastern region of Indonesia's sea territory.

Computer communication network in the Indonesian Eastern Fleet are supported from the four main naval bases: Surabaya, Ujung Pandang, Bitung, and Jayapura, which are designed to connect remote naval bases and all naval units dispersed through the entire eastern region. Information systems play an important role in enabling the Indonesian Navy to execute fleet operations all over the country. The Indonesian Eastern Fleet has identified that improvements in its information systems especially its network infrastructure and connectivity are required in order to obtain an effective and efficient naval fleet. The Indonesian Eastern Fleet Network has communication system resources such as telephone, radio-link, microwave-link and satellite systems. Those existing communication system resources are still not linked for optimal data communication exchange to computer systems in local area networks (LANs) or in an integrated wide area network (WAN). This thesis will recommend a method for implementing an

integrated wide area network using web-based network management to utilize the existing computer communication systems in the Indonesian Eastern Fleet.

The arrival of the information age has led to an explosion of distributed users, databases and communications networks in the military sector as well as in the commercial sector. Computer networks today have evolved into complex and often tangled systems. The primary reasons for networking computers are to share information, to share hardware and software, and to centralize administration and support. Effective local area networks (LANs) and an integrated wide area network (WAN) are required to achieve connectivity of the Indonesian Eastern Fleet Network.

Organizations adopting LANs and WANs must also adopt clear techniques and tools to tame these beasts. The organizations that become over reliant on their networks could experience devastating results if down time were encountered. The network administrator's job has become increasingly critical to manage and control the operation of the network. Network management can be defined as the processes and techniques that ensure an organization's network is operating properly and efficiently. The Indonesian Eastern fleet requires the appropriate system to manage and control its network. The implementation of a web-based network management appears to be well suited to support the Indonesian Eastern Fleet's missions and operations. There is a wealth of knowledge that can be effectively captured and transferred wherever needed within the Indonesian Eastern Fleet Network.

## **B. PURPOSE**

The objective of this thesis is to present a model of an integrated wide area network using web-based network management to support fleet operations of the

Indonesian Eastern Fleet. It surveys possibilities for improving computer communications systems to provide a fast, reliable, and effective way of gathering and distributing information to all fleet units. This thesis recommends a standardized LAN infrastructure and the use of common network hardware and software to support web-based network management of the Indonesian Eastern Fleet Network. It reviews current technologies and provides an assessment for future use.

### **C. SCOPE AND THE ORGANIZATION OF THE STUDY**

The scope of this thesis is limited to the following:

- A review of computer and communications networks, and a study research in designing the Indonesian Eastern Fleet Wide Area Network
- An in-depth review of web-server-based technology and Internet Information Server (IIS) 5.0
- An in-depth review of network management and security
- An evaluation of how computer and communications networks using web-based network management can be used effectively to support successful fleet operations
- Web-Based Wide Area Network design using the EXTEND-4 simulation software program

### **D. METHODOLOGY**

The methodology used in this research consists of the following steps:

- Conduct an in-depth search and review of available books, magazine articles, documents, and other library information resources regarding computer networking, web-server technology, network management, and information technology management to acquire the ability to propose a successful information technology strategy
- Develop and administer a user requirements study
- Conduct a search of the Internet and websites for information from military and commercial sources

### **E. THESIS OUTLINE**

This section provides an outline of the different parts of this thesis that explores the general concept of web-based network management and the specific client application



for improving the computer communication network systems in the Indonesian Eastern Fleet.

Chapter I: Introduction – provides a brief description of the development of computer communication systems in the Indonesian Eastern Fleet, the object of this thesis, and the organization of the study.

Chapter II: Problem Definition - describes the need for connectivity in the Indonesian Eastern Fleet Network to support successful fleet missions and operations.

Chapter III: Computer Communication Network - provides an introduction to the fundamental concepts of networks that is needed as a framework for understanding the concepts of network infrastructure, design and implementation.

Chapter IV: Designing Local Area Networks Infrastructure - provides the fundamental guide lines for designing LANs infrastructure, recommends a standardized LAN architecture, LAN connection options, and the selection of a network operating system.

Chapter V: Web-Based Wide Area Network Design - discusses WAN connection services, linking the network, and implementing an integrated WAN. Recommends the appropriate choice of WAN links service, WAN Hardware and Software. The last part of this chapter discusses managing the WAN using web-based technology.

Chapter VI: Describes the proposed WAN design using the EXTEND-4 simulation software program.

Chapter VII: Conclusion.

## **F. EXPECTED BENEFITS OF THIS THESIS**

This thesis will become the foundation of web-based technology studies in the Indonesian Eastern Fleet to achieve the needed network management improvement. The integrated wide area network is expected to support the Indonesian Eastern fleet in making critical changes in how they do business, and ultimately result in increased readiness, contributory support, and overall effectiveness. Central to these benefits is the establishment of a standardized network infrastructure and making significant changes to business practices that will fully utilize the available technology.

The overall benefit of implementing a web-based wide area network is improved fleet readiness through a better computer communications network, real-time fleet support, training and information exchange, and a more responsive method of managing requests for support from the Fleet. Implementing a web-based network management enables the improvement of the organization through more efficiently sharing and gathering information. It enables users to combine knowledge and experience of the entire organization and to fully exploit information technology systems for strategic purposes.

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## **II. PROBLEM DEFINITION**

### **A. MISSION**

The mission and operation of the fleet can be conducted successfully if there is sufficient support from its existing system. The mission of the Indonesian Eastern fleet is to conduct daily sea operations to enforce the law at sea and to maintain sovereignty in the entire eastern sea territory of Indonesia. Coordination and communications systems are crucial to successful operation and to accomplishing the mission. An integrated decision making system and real time access to all relevant data and information are essential to successful fleet operations. This is the point at which information technology infrastructure becomes important; especially the establishment of the Indonesian Eastern fleet wide area network.

A reliable computer communication system is expected to provide an effective method to accomplish the fleet's missions and provide contributory support. It is an essential tool for carrying out the Indonesian Eastern fleet's mission given the complexities of coordinating the fleet. Naval base and naval unit location, unit placement and composition, and communication systems operations are among the factors affecting the fleet operations strategy. All of these components could be better administered with an integrated wide area network computer communications system.

### **B. THE REQUIREMENTS OF THE INDONESIAN EASTERN FLEET INFORMATION SYSTEMS**

#### **1. The Need for Connectivity**

The Indonesian Eastern Fleet requires connectivity as a central concept in computer and communications networks. A military organization such as the Indonesian

Eastern Fleet relies on applications like database management systems, electronic mail, and integrated decision-making systems for supporting fleet operation. Any collection of independent computers in all office units in the Indonesian Eastern Fleet need to be able to communicate with one another over a shared network medium. Connectivity provides a means to individually address any device on a network. One aspect of information technology enhancements for the Indonesian Eastern fleet has been the implementation of a plan to establish a wide area network (WAN).

## **2. Effective Local Area Networks (LANs) and an Integrated Wide Area Network (WAN)**

The Indonesian Eastern fleet needs a global, high-speed, interactive computer-network with adequate capacity for voice, video, and a wide range of data communication among its operational units including naval bases, warships, and aircraft. The suitable network would facilitate "just in time" transmission of Indonesian navy policies and positions as well as statements by navy leaders.

The Indonesian Eastern Fleet needs a network system that provides quick access to information via real time databases no matter what the time differences between fleet headquarters in Surabaya and all units in the entire eastern fleet operational area. This wide area network would enhance collaboration on regional strategies and policies across geographic boundaries at no additional cost.

## **3. Improved Access to the Internet and Other Information Services**

The Indonesian Eastern fleet needs the link of computer communication systems that provides improved access to the Internet and other information services. The network would also result in substantial savings. This rapid, interactive network would

provide fast and cost-effective services that will improve the Indonesian Eastern Fleet's information system technology.

#### **4. Minimize Costs**

The improvement of Information Technology systems needs a lot of budget available. However, we need to minimize cost that will be spent on designing and building the network, so it will meet the Indonesian Eastern Fleet's budget allocation.

### **C. THE INDONESIAN EASTERN FLEET NETWORK**

Local area networks (LANs) are currently being established in Surabaya main Naval base. The Indonesian Eastern Fleet headquarters is located here from where the communications systems for the entire eastern fleet area are managed and controlled. There are three LANs that are being established in Surabaya: the Indonesian Navy Eastern Fleet headquarters LAN, Surabaya main Naval base LAN, and Juanda Naval air base LAN. In the near future, local area networks are planned to be established in Ujung Pandang, Bitung and Jayapura. These local area networks will be connected together as an integrated wide area network. The improved Indonesian Eastern Fleet network system is required to effectively communicate within the Indonesian Eastern Fleet organization as well as with their Navy counterparts.

The use of computer systems in gathering and distributing information is essential to the daily operations of fleet units. Most operational and administrative offices in the Indonesian Eastern Fleet are equipped with computer systems. The fleet's four main naval bases and their remote naval bases are widely dispersed geographically. This wide dispersion has made it difficult and costly to integrate all the bases into a wide area network, whether by cable, satellite, or dial-up phone.

Computer communication networks are supported from the four main Naval bases in an integrated WAN and are designed to connect remote naval bases dispersed through the entire eastern region. The problem regarding long distance among those widely dispersed naval bases could be solved using web-based technology. An integrated WAN would be able to efficiently connect computer and communication systems in those diversified main naval bases and their remote naval bases. Fleet contributory support to the Navy gaining commands, administrative requirements, and training and exercises will be fulfilled more efficiently using an improved Indonesian Eastern Fleet Network.

#### **D. DESIGN GOALS**

The goal of this thesis is to recommend standardized local area network and wide area network configuration that will meet the requirements of the Indonesian Eastern Fleet. The primary goals for the new systems are efficiency, speed and high reliability. By interconnecting all of the Indonesian Eastern fleet's computer communication systems in an integrated web-based wide area network, we gain several advantages, such as improved efficiency, increased productivity, saving effort, seizing opportunities and reduced costs.

The integrated web-based wide area network should be able to take advantage of information systems support by linking all the existing computer and communication systems resources in all of the Indonesian Eastern Fleet units. It should also be managed by a proper network management system to ensure the network operation always run properly. With improvements in information systems technology, the Indonesian Eastern fleet can have effective and rapid access to various strategic planning systems. This

includes force structure and the development of Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities.



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### **III. COMPUTER COMMUNICATION NETWORK**

This chapter introduces the fundamental concepts of networks as a framework for understanding the concepts of network infrastructure, design and implementation. Networking deals with the technology and architecture of the communications networks used to interconnect communicating devices. A network consists of computers and other devices, the physical connection between them, and the additional hardware and software required to enable them to communicate with each other. Why are computer networks important? What motivates people to connect computers together? Sharing is the chief motivation for networking computers. A network enables us to share resources such as files, software application, and devices (hard disks, printers, modems, and so forth). Having a computer communication network enables our organization to work, cooperate and communicate with great efficiency.

#### **A. DATA COMMUNICATION NETWORKING**

The fundamental purpose of a communications system is the exchange of data between two or more parties. Electronic communications provide the means for the transmission, reception and processing of information between two or more locations using electronic circuits [Tomasi, 1998].

Many problems appear when multiple communicating devices are directly connected point-to-point. It is very expensive to string a dedicated link between two devices that are separated by thousands of kilometers. The other problem occurs when each node requires a link to many of the others at various times. The solution to this problem is to attach it to a communication network. A network is a group of computers

and various devices (such as printers and routers) that are joined together in a common network medium.

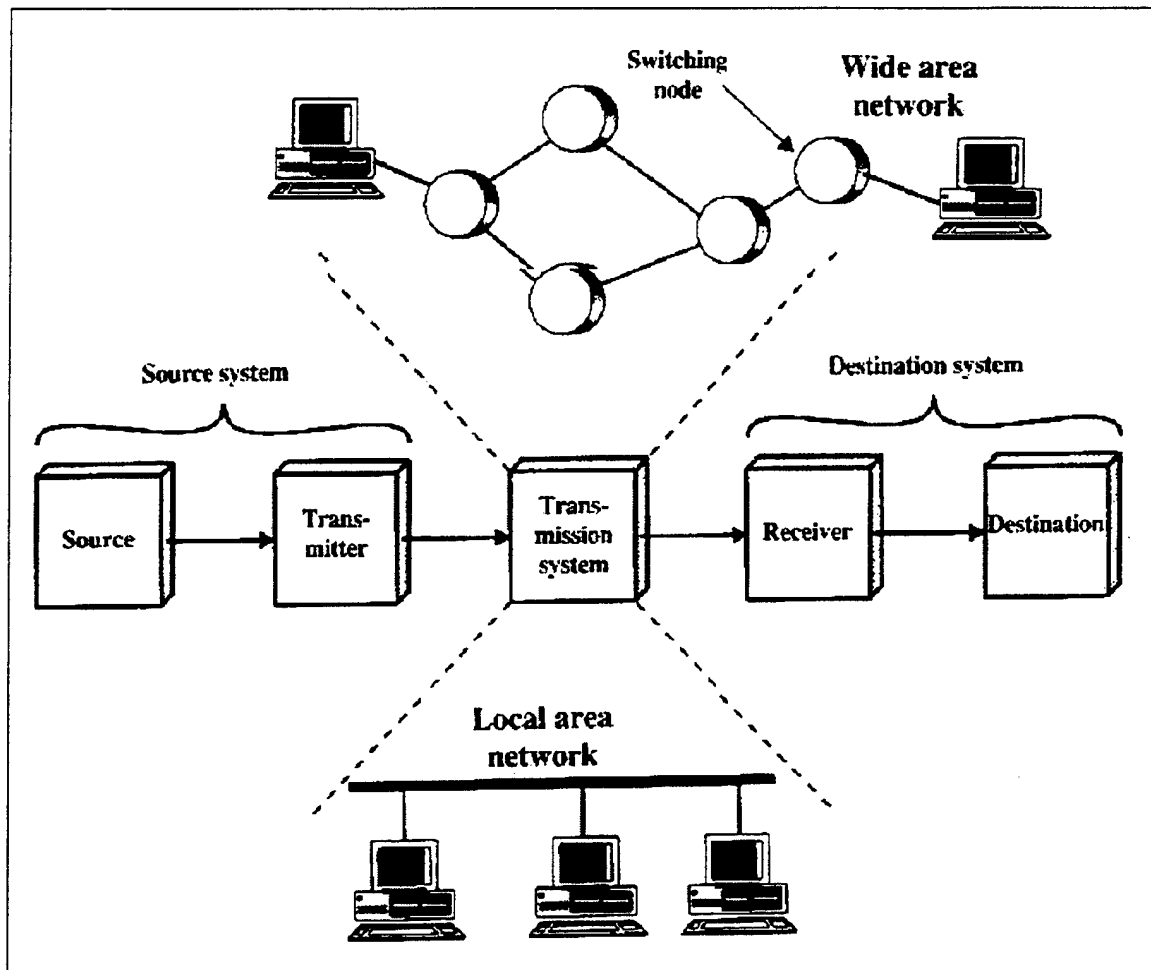


Figure 1. Simplified Network Model. [From Stallings, 2000, p.10]

Figure 1 illustrates the two major types of computer communication networks distinguished by their size and location, as a local area network (LAN) and a wide area network (WAN). A local area network (LAN) is the basic building block of any computer network. It is a group of interconnected computers located relatively close to each other which permits users to share information and resources. A LAN can range from a simple network with two computers connected by a cable, to a complex network

with hundreds of connected computers and peripherals throughout a major corporation.

Within a building or campus-style corporate complex, a LAN would be used for:

- ***Interactive Computing:*** The LAN supports flexible database access and resource sharing among groups of users
- ***Switching among multiple host computers:*** LANs allow virtual circuits from a user to several computers
- ***Broadcast and flexible addressing:*** A LAN allows messages to be received by some or all users in a system

A wide area network (WAN) has no geographical limit. It can connect computers and other devices on opposite sides of the world. A WAN is made up of two or more LANs connected together. LANs support transmission over relatively short distances, while WAN's packet-switching technology support transmission in a large geographical area.

## **B. PEER-TO-PEER AND SERVER BASED NETWORK**

Both peer-to-peer and server based exist as the configuration of the end systems of the networks. A peer-to-peer network is where each computer on the network is both a client and a server. All computers are equal, and each workstation functions independently in its administration and operation. A client on the network can access any other client's files, no single person is assigned to administer the resources of the entire network. Users are responsible for making shared resources available, maintaining applications and data on their own computers, installing and upgrading applications, and deciding who gets access to their shared resources.

In a server-based network, one or more computers act as servers and provide the resources to the network. The other computers are the clients and use the resources provided by the servers. A server-based network has a network administrator responsible

for managing the network. Shared data files, programs, and resources are centralized to one or more specially configured computers called a server. All network administration, security, and maintenance are managed by the network administrator. Client/server computing uses a powerful server to store data. The client workstation can process some or all of the requested data. The data is secure and easy to maintain because the file services are in one location on the server.

Centralization provides reliability and consistency in network administration. One advantage of server-based network is better performance, several computers can process applications in parallel. We can distribute application programs to the client computers and the database is processed by the server computer.

### **C. NETWORK TOPOLOGY**

Network topology has an important role in designing a network. A topology is the physical layout of computers on a network. Topologies can be physical (actual wiring) or logical (the way they work). A network's topology is a map of the arrangement of its nodes and connections between them. There are several network topologies that we can choose among for the Indonesian Eastern Fleet network:

#### **1. Bus Topology**

In the bus network topology, we connect each node to the network along a single piece of network cable, called a bus. The bus provides the path for the data, and devices tap into the bus along its length to communicate with other devices. Data travels from a node out onto the bus until it reaches the ends of the cable. At each end of the bus, a device called a terminator is installed to prevent data signals from reflecting back onto the bus and causing errors. When the transmitted data hits the terminator, it does not go

any farther. The disadvantage of this topology is that if the single cable acting as the bus is severed at any point, the entire network goes down. Bus topology is used in the Ethernet LANs configuration.

## **2. Star Topology**

In the star network topology, the computers network nodes are connected to a central device called a hub. Small LANs with less than eight nodes usually need only one hub. Larger networks may require many hubs, and hubs can be connected to each other to tie all the nodes together into a single network. Hubs are used to centralize the data traffic and localize failures. If one cable breaks, it will not shut down the entire network.

## **3. Ring Topology**

The ring network topology is made up of an unbroken circle of network nodes. Each node is directly connected to its two immediate neighbors. The data is passed from one computer to another around the circle. If the ring is broken at any point along the way, the entire network stops functioning. This problem is solved in FDDI LANs configuration by using double-linked rings. Token Ring LANs and FDDI LANs configuration use the ring network topology.

## **4. Star Bus Topology**

The star bus is a combination of the bus and star topologies by linking several star topology networks with linear bus trunks. It will not affect the rest of the network if one computer goes down. However if a hub goes down, all computers on that hub are unable to communicate, and if this hub is linked to other hubs those connections also will be broken.

## **5. Star Ring Topology**

The star ring topology is a combination of the star and the ring topology. Both the star ring and the star bus are centered in a hub that contains the actual ring or bus. Linear-bus trunks connect the hub in a star bus, while the hubs in a star ring are connected in a star pattern by the main hub.

### **D. PASSING DATA ACROSS A NETWORK**

Windows 95/98/ME, Windows NT 4.0, Windows 2000, and other network operating systems have implemented a layered, modular networking architecture. That architecture is based on an industry standard called the Open System Interconnect (OSI) Reference Model.

The OSI model defines an approach to networking in which each layer is responsible for a very specific portion of the networking function. It provides a framework for understanding the software and hardware components of networks and how they interact with each other.

Figure 2 depicts the OSI reference model that passes the data from one layer to the next in its journey from source to destination. It describes the flow of data in a network from the lowest layer, representing the physical network connection, to the highest layer, representing the services used directly by applications.

The data begins its journey at the highest layer on Node A and travels down until it reaches the physical network. The information travels over the physical network and arrives at the lowest layer on Node B. It then travels up on Node B until it reaches the application layer. On its way up through the Node B layers, the control information that

was added on Node A is stripped off, layer by layer, until the application receives the original data that was sent by the application on Node A.

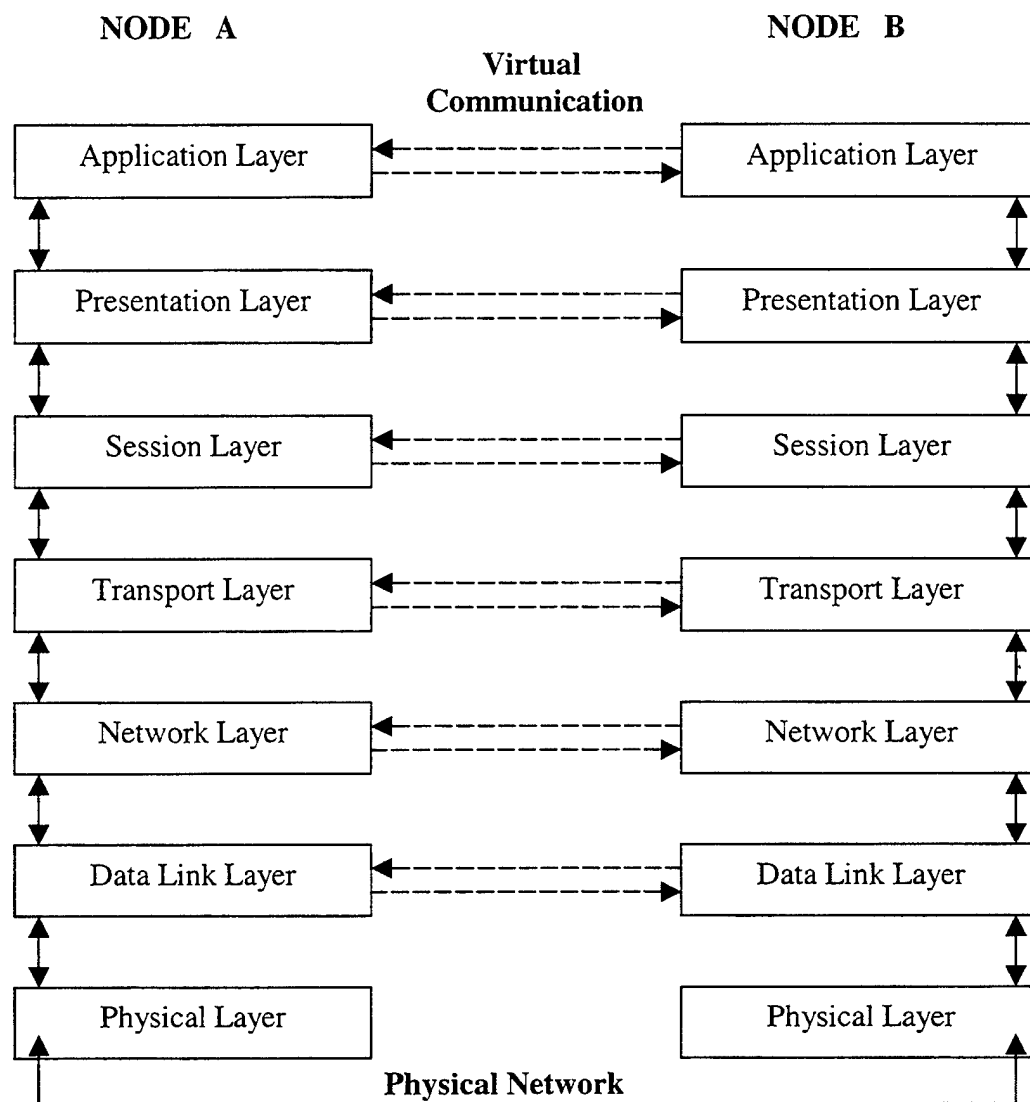


Figure 2. The OSI Reference Model.

The explanation below shows the roles and responsibilities of each layer in the OSI reference model:

### 1. Layer 1 - Physical Layer

The physical layer is responsible for transmitting raw binary data on the network cable. This layer is the closest to the network hardware and includes both the physical



specifications of how network nodes are connected, and the electrical details of how raw data bits are transmitted and received over the connection medium. It defines how data bits are represented when they are transmitted on the cable. A repeater operates exclusively at the physical layer of the OSI model. The data packets handled by the repeater are exactly the same coming in as they are going out. All other network devices that transmit or receive information on the network also operate at this layer.

## **2. Layer 2 - Data Link Layer**

The Data Link layer packages the raw stream of data into data frames for transmission. A frame is a manageable, logical chunk of information that includes the data to be transmitted as well as information about its source and destination. It also includes information that helps the recipient of the transmission detect whether the data arrived intact. The data link is responsible for preparing data frames for transmission, receiving data frames, managing the network access method, and assuring error-free node-to-node communication.

The Data Link layer is divided into two sublayers: *Logical Link Control (LLC)* and *Media Access Control (MAC)*. The LLC manages connections between network nodes and controls the flow of data frames. The MAC sublayer manages the network's access method. In an Ethernet environment, the MAC sublayer implements the CSMA/CD access method. The MAC sublayer isolates the access method management functions from the other functions of the data link layer. It also ensures an error-free communication path between nodes by retransmitting data frames and throwing away duplicate frames when necessary. ATM, Frame relay and X25 are designed to

interconnect point-to-point links. They do not have any MAC protocols and this is one of the reasons that terrestrial WAN protocols are suited to radio WANs.

### **3. Layer 3 - Network Layer**

The network layer is concerned with packet switching. It addresses data transmissions and translates logical into physical addresses. The network layer determines the route of each packet from the sender to the receiver. The Internet Protocol (IP) operates at the network layer and it is stateless and connectionless.

Routers also operate at the network layer and they can route packets across several networks. A router can reach into a data packet, reading and interpreting its embedded addressing information. It uses this information to update its routing tables for the next packet that comes along.

### **4. Layer 4 - Transport Layer**

Transport layer provides transparent transfer of data between end points. Transport Control Protocol (TCP) and User Datagram Protocol (UDP) operate at transport layer. All state of connections resides in the transport protocol. TCP is a transport protocol that does error checking and ensures all packets are delivered efficiently, without error, and processed in the same sequence in which they were sent. UDP is a transport protocol that provides application programs with connectionless communication service but does not error checking.

### **5. Layer 5 - Session Layer**

The session layer is concerned with network management by handling password recognition, logon and logoff procedures, and network monitoring and reporting. The session layer enables application processes on two different nodes to establish,

communicate over, and terminate an end-to-end connection called a session. The session layer focuses on managing the entire dialog between the two processes by controlling who transmits when and for how long. Just as the transport layer ensures in-sequence delivery of packets, the session layer ensures in-sequence delivery of messages.

#### **6. Layer 6 - Presentation Layer**

The presentation layer controls the formats used to exchange data between network nodes. It translates application data into a commonly recognized form at the sending node, and translates the data from the common form to an application-specific form at the receiving node. It controls how the network presents itself to applications which include character set conversion, data compression/expansion, encryption and decryption, file format translation, and graphics command expansion.

#### **7. Layer 7 - Application Layer**

Network programs found at the Application layer include electronic mail, database managers, file-server software, and printer-server software. The application layer handles messages, remote logons, and network management statistics.

### **E. NETWORK SHARED MEDIUM**

Network shared medium is used to transmit data over the network and this is an essential element of a computer communication network. Nowadays, transmission media can take the form of cabling system and wireless system. The main types of media available for use in implementing a LAN is as follows:

#### **1. Cabling System**

The vast majority of networks today are connected by some sort of wiring that act as a network transmission medium that carries signals between computers. Many cable types are available to meet the varying needs and sizes of networks. The majority of

networks are connected by one of two major classes of cable: twisted-pair (unshielded and shielded) cable or fiber-optic cable.

*a. Twisted-Pair Cable*

Twisted-pair cable consists of two insulated strands of copper wire twisted around each other: unshielded twisted-pair (UTP) and shielded twisted-pair (STP) cable.

(1) Unshielded Twisted-Pair (UTP) Cable. UTP cable consists of two insulated copper wires, and it has four individually twisted pairs of wires in a common sheath. There are five standard categories of UTP to ensure consistency of products for customers:

- **Category 1 UTP** can carry voice but not data transmissions
- **Category 2 UTP** is rated for signals of 4 MHz with a data rate of 4 Mbps
- **Category 3 UTP** is rated for signals of 16 MHz with a data rate of 16 Mbps. It supports 10 Mbps Ethernet, 16 Mbps Token ring, and 100VGAnyLAN with a maximum length of 100 m per segment.
- **Category 4 UTP** is rated for signals of 20 MHz with a data rate of 20 Mbps. It consists of four twisted pairs of copper wire.
- **Category 5 UTP** is rated for signals 100 MHz or less and supports 100 Mbps Fast Ethernet. Individual cable runs should not exceed 100 meters, including the patch panel and patch cable.
- **Category 5 Enhanced UTP** is rated for 200 MHz with a data rate of 200 Mbps. Category 5 Enhance UTP is now being used in most new constructed LANs.

(2) Shielded Twisted-Pair (STP) Cable. STP cable uses a woven copper-braid jacket that is more protective and of a higher quality than the jacket used by UTP. STP also uses a foil wrap around each of the wire pairs. This gives STP excellent shielding to protect the transmitted data from outside interference, which in turn allows it to support higher transmission rates over longer distances than UTP.

### ***b. Fiber-Optic Cable***

Fiber-optic cable is the best choice when the network needs to transmit data at very high speeds over long distances in a very secure media. At the present time, fiber is commonly used in campus networks at all levels above the desktop computer communications.

The Fiber-optic cable principles of operation are different than a copper cable. Copper cable transfers information in the form of transverse electromagnetic waves while optical fibers carry digital data signals in the form of modulated pulses of light. This is a relatively safe way to send data because no electrical impulses are carried over the fiber-optic cable. This means that fiber-optic cable cannot be tapped as easily, and its data cannot be stolen as easily. Fiber-optic cable is good for very high-speed, high-capacity data transmission because of the purity of the signal and lack of signal attenuation. Currently industries are using OC-192 (10 Gbps) for their network transmission. However, because fiber is point to point it cannot be used for bus topologies.

## **2. Wireless System**

Wireless technology uses either optical or radio techniques to transmit data. Computers operating on a wireless network function similar to cable networks, except that the network interface card (NIC) is connected to a wireless transceiver instead of a cable. A wireless bridge can connect buildings that are situated as much as 40 kilometers (about 25 miles) apart. Cellular communication, satellite stations, and packet-radio communications are adding mobility to networks. Wireless LANs use four techniques for transmitting data:

**a.     *Infrared Transmission***

Infrared networks transmit and receive data using a high-intensity infrared light beam. Infrared transmission has a line-of-sight limitation. If someone walks between the two computers, the wireless connection is broken until there is a clear path again.

**b.     *Laser Transmission***

Laser networking technology is similar in concept to infrared. It requires an unbroken direct line of sight between sender and receiver. People or objects that get in the way will block transmission. Laser technology is more expensive than infrared.

**c.     *Narrowband Radio Transmission***

Narrowband radio uses an approach similar to a radio station. The sender and receiver use a specific radio frequency.

**d.     *Spread-spectrum Radio Transmission***

Spread-spectrum radio transmission broadcasts its transmissions over a range of radio frequency instead of just one. It divides the available frequency into channels. All the wireless nodes in the network synchronize to a specific channel.

**3.     **Cabling System versus Wireless System****

A wireless system is convenient, does not require wiring, and is certainly more flexible than a traditional cable network. On the other hand, a wireless system is relatively high cost and its transmission systems relatively slower than CAT-5 UTP cable or fiber optic cable. The fastest data transmission speed over a wireless LAN at the present time is 23.5 Mbps [Computer Magazine, Oct. 2000], while a cabling system LAN using CAT-5 UTP transmits at 100 Mbps; and fiber optic cable in a Gigabit Ethernet is even faster.

So, if our network investment is measured in terms of the cost and bandwidth, wireless networking offers the lowest value. Due to its high cost and transmission speed, wireless is a good alternative only if we have a real need for it. A cabling system is more appropriate for use in the Indonesian Eastern Fleet network as its LAN shared medium.

## **IV. DESIGNING THE INDONESIAN EASTERN FLEET LANS INFRASTRUCTURE**

This chapter forms the foundational guidelines for designing and implementing the Indonesian Eastern Fleet LAN's infrastructure. In designing LAN infrastructure, it is necessary to know the concepts associated with designing the logical layout of our network, as well as the issues involved with creating the physical network infrastructure. Understanding the end user requirements is important because end users will interact with the application running on their network. We must learn what the end user needs, determine which software will best provide that functionality, and finally build software distributions of public domain programs that meet all user requirements for network-based operations. The Indonesian Eastern Fleet network's most important end users are computer operators, naval units personnel, and fleet support facilities personnel. Defining an appropriate technology design and selecting a useful network operating system will determine the performance and the capability of the network.

### **A. NETWORK ANALYSIS**

Network analysis is needed in designing the Indonesian Eastern Fleet network in order to fully understand our design environment. This involves identifying, gathering, understanding system requirements, and developing performance thresholds to determine specified services for the network. The computer network designed must meet the needs of the organization. The Indonesian Eastern Fleet's network goals are to:

- Network the existing computers so that they can more efficiently share information and network resources
- Provide a full access Internet connection
- Provide video conferencing facility



- Provide hypermedia technology including: text, graphics, image, audio, and archive
- Improved fleet readiness through an improvement in information systems technology
- Minimize cost

The network analysis process begins by defining the requirements of our network. Next these requirements will be matched to the existing telecommunication features available and then determine what steps are needed to develop the network. At a minimum, we should consider requirements of the network that consists of:

- The number of users
- The size of the facility
- The environment (office, manufacturing, out-of-doors)
- Performance Characteristic, which include:
  - Storage (disk drive) performance
  - Processor (CPU) performance
  - Memory performance (access time)
  - Bus performance (bus capacity and arbitration mechanisms)
  - Operating system performance

Information about any of these components can be helpful in estimating the overall performance of computer network as seen in figure 3 below.

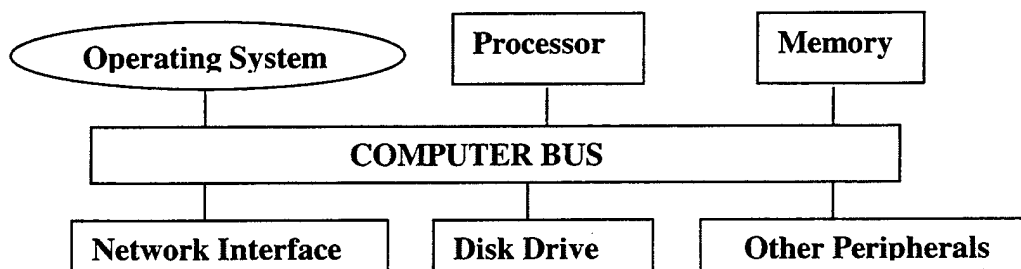


Figure 3. Computer Network Performance Components.

- Location information. It helps to determine the relationships between components of the system.

## **B. THE STANDARD LAN ARCHITECTURE: ETHERNET TECHNOLOGY**

A network's architecture specifies the desired structure of the network. Its purpose is to provide an organization with a framework for more informed decision-making and a guide for ongoing planning. It includes some specification of standards, distribution of system functions and how the components relate to one another.

A standard architecture is critical to the establishment of the Indonesian Eastern Fleet Network. The architecture's main purpose is to provide guidance and structure for implementing the network. It helps to define the information technology strategy. A uniform strategy is needed to insure that all LANs are implemented similarly. This will help to insure that the LANs will function effectively when incorporated into the Indonesian Eastern Fleet Network. The LAN architecture is one part of the overall WAN network architecture. Without a standard LAN architecture, it will be difficult to manage and connect the collection of disparate systems. A uniform approach that conforms to published guidance on standardization will result in a more viable network.

The network architecture can be selected based on its topology, access method, signaling method, or support of a particular type of transmission medium. Although there is no one best network for users, Ethernet represents a diverse mixture of technological characteristics. In the 1980s the IEEE published Project 802. This project generated standards for design and compatibility for hardware components that operated within the OSI physical and data-link layers. The standard that pertains to Ethernet is the IEEE 802.3 specification. Ethernet network architecture strikes a good balance between speed, cost and ease of installation.

## 1. THE IEEE 802.3 ETHERNET NETWORK

### a. *The Features*

Talking about the Ethernet features begins with the topology. The traditional topology such as a linear bus or another topology such as a Star Bus can be used. The IEEE 802.3 Ethernet Network relies on Carrier Sense Multiple Access/Collision Detection (CSMA/CD) as its access method to regulate traffic on the main cable segment. If two or more computers happen to send data at exactly the same time, there will be a data collision. When that happens, the two computers involved stop transmitting for a random period of time and then attempt to retransmit. Each computer determines its own waiting period; this reduces the chance that the computers will once again transmit simultaneously. Commonly, many computers on the network attempt to transmit data (multiple access); each one first listens to detect any possible collisions. If a computer detects a possible collision, it waits for a random period of time before retransmitting (collision detection). CSMA/CD is known as a contention method because computers on the network compete for an opportunity to send data. Nowadays users should not aware when they are using a contention access method because current implementations are very fast. CAT-5 UTP cable transmits at 100 Mbps and this problem was solved. Table 1 below describes the features of Ethernet technology that we can use to determine our plan in building the local area network infrastructure.

Feature	Description
Traditional topology	Linear bus
Other topologies	Star bus
Type of architecture	Base band
Access method	CSMA/CD
Specification	IEEE 802.3
Transfer speed	10 Mbps or 100 Mbps
Cable type	Cat-5 UTP

Table 1. The Features of Ethernet Technology.

***b. Constructing the Ethernet Network***

In constructing an IEEE 802.3 Ethernet network either the 10-Mbps IEEE Standards or the 100-Mbps IEEE Standards can be used. A 10 Base-T and a 100 Base-T network can be constructed with network interface cards (NICs), UTP cable, and one or more hubs. Each is installed in the expansion slot of a computer and wired on a point-to-point basis to a hub port. When all the ports on a hub are used, one hub can be connected to another to expand the network, resulting in a physical star, logical bus network structure.

In the definition process of standardization development, both the Ethernet media access control (MAC) and the physical layer require adjustments to permit 100 Mbps operational support. The 10 BASE-T and 100 BASE-T standard supports an operating rate of 10 Mbps at a distance of up to 100 meters (328 feet) over UTP cable without the use of a repeater. The wiring hub in an Ethernet network functions as a multiport repeater: it receives, retimes, and regenerates signals received from any attached station. The hub also functions as a filter; it discards severely distorted frames.

All hubs that conform to IEEE 10/100 BASE-T specifications perform a core set of tasks in addition to receiving and regenerating signals. 10/100 BASE-T hubs test each port connection, detect and handle excessive collisions, and ignore data that exceeds the maximum 802.3 frame size.

Hubs can monitor, record, and count consecutive collisions that occur on each individual station link by using a management agent. Since an excessive number of consecutive collisions will prevent data transfer on all of the attached links, hubs are required to cut off or partition any link on which too many collisions have occurred. This

partitioning enables the remainder of the network to operate in situations where a faulty NIC transmits continuously.

*c. The Ethernet Frame Operations*

Ethernet breaks data down into frames. A frame is a package of information transmitted as a single unit. It is used to deliver data between computers. An Ethernet frame can be between 64 and 1518 bytes long, but the Ethernet frame header uses at least 18 bytes. Every frame contains control information and follows the same basic organization.

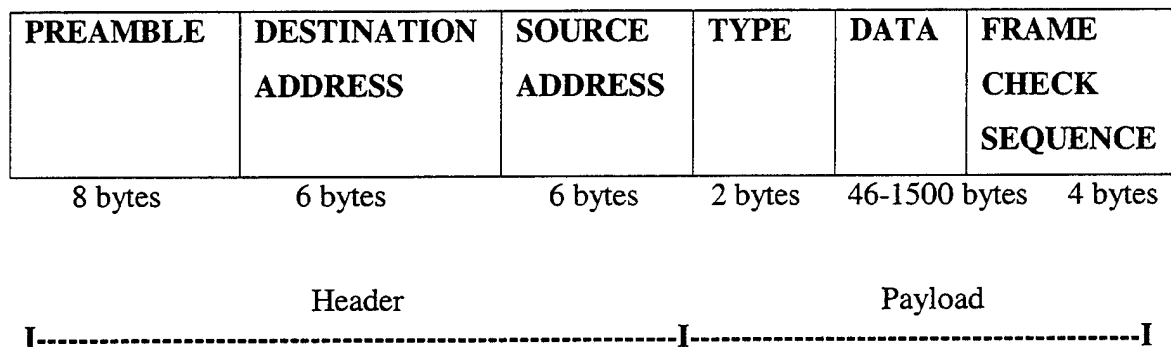


Figure 4. The Ethernet Frame Format.

The Ethernet packets begin with a Preamble that consists of eight bytes and is used for synchronization. The first two fields in the frame carry 48-bit addresses, called the destination and source addresses. The IEEE controls the assignment of these addresses by administering a portion of the address field. The IEEE does this by providing 24-bit identifiers called "Organizationally Unique Identifiers" (OUIs), since a unique 24-bit identifier is assigned to each manufacturer that wishes to build Ethernet interfaces. This 48-bit address is also known as the physical address, hardware address, or MAC address. The destination address can be a single workstation's address, a group of

workstations, or even several groups of workstations. The source address tells the workstation receiving the message where it came from.

As each Ethernet frame is sent onto the shared signal channel, all Ethernet interfaces look at the first 48-bit field of the frame, which contains the destination address. The interfaces compare the destination address of the frame with their own address. The Ethernet interface with the same address as the destination address in the frame will read in the entire frame and deliver it to the networking software running on that computer. All other network interfaces will stop reading the frame when they discover that the destination address does not match their own address.

The Type field designates which type of format the data is using. Without this information, it is impossible to decipher the packet when it arrives. The Data field is strictly limited; it can hold only a minimum of 46 bytes and a maximum of 1,500 bytes. Frame-Check Sequence provides a mechanism of error detection. It contains a check system of the rest of the frames which allow receiver to detect error.

Computers attached to an Ethernet can send application data to one another using high-level protocol software, such as the TCP/IP protocol suite used on the worldwide Internet. The high-level protocol packets are carried between computers in the data field of Ethernet frames. The system of high-level protocols carrying application data and the Ethernet system are independent entities that cooperate to deliver data between computers.

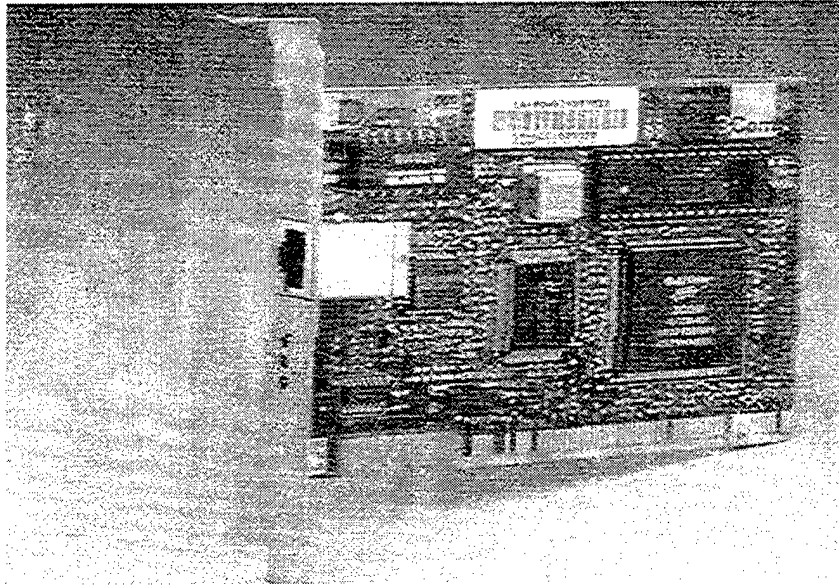


Figure 5. Fast Etherlink 100 BASE-T XLK NIC.

## 2. Fast Ethernet (100 Mbps) Network

One version of Ethernet technology that widely used is the 10 Mbps twisted-pair category. Fast Ethernet (100 Mbps) is a more recent Ethernet standard which operates over twisted-pair and fiber optic media and has become the accepted standard. Fast Ethernet transmits data much faster than Ethernet, and it also has some other advantages when used in the LAN architecture. These include moderate throughput, numerous vendors, strong commercial support, reliable multi-vendor interoperability and availability in a fiber version.

Fast Ethernet LAN specifications include 100 BASE-TX and 100 BASE-FX. Each specification maintains the use of the MAC protocol used by earlier Ethernet/IEEE 802.3 standards, CSMA/CD. 100BASE-T specifies 100-Mbps operations using the CSMA/CD protocol over two pairs of category 5 UTP cable. 100BASE-FX changes the LAN transport media to fiber optic cable.

IEEE Media Specifications	Cable Support	Connector Support	Coding Scheme
100BASE-TX	Category 5 UTP (2-pair wire)	RJ-45	4B/5B
100BASE-FX	62.5/125-micron fiber-optic cable	RJ-45	4B/5B

Table 2. Fast Ethernet Functionality.

Fast Ethernet 100BASE-TX is inexpensive compared to 100Base-FX because category 5 UTP cable is cheaper than fiber-optic cable. Even though data transmitted over fiber-optic cable is very fast and secure, data transmitted using category 5 UTP cable is already fast enough and good enough to meet the Indonesian Eastern Fleet Network requirements. The Ethernet specifications (IEEE 802.3) of the 10Base2, 10BaseT, and 100BaseTX are explored in Table 3.

	10Base2	10BaseT	100BaseTX
<b>Topology</b>	Bus	Star bus	Star bus
<b>Cable type</b>	RG-58 (thinnet coaxial cable)	Category 3, 4, or 5 unshielded twisted-pair cable	2-pair Category 5 UTP or STP
<b>Connection to NIC</b>	BNC T connector	RJ-45	RJ-45
<b>Distance</b>	0.5 meters between computers (Max 185 m)	100 meters (328 feet) between the computer and the hub	100 meters (328 feet)
<b>Maximum cable segment length</b>	185 meters (607 feet)	500 meters (1640 feet)	100 meters (328 feet)
<b>Maximum computers per segment</b>	30 (There can be a maximum of 1024 computers per network.)	1 (Each station has its own cable to the hub. There can be a maximum of 12 computers per hub and a maximum of 1024 transceivers per LAN without some type of connectivity.)	N/A

Table 3. Ethernet Specifications (IEEE 802.3).



### **3. GIGABIT ETHERNET (1000 Mbps) NETWORK**

Gigabit Ethernet provides a data transmission capability of 1000 Mbps and supports the CSMA/CD access protocol. Similar to 10 Base-T and Fast Ethernet, Gigabit Ethernet can be used as a shared network through the attachment of network devices to a 1-Gbps repeater hub. It provides 1-Gbps ports to accommodate high-speed access to servers. Gigabit Ethernet operations require workstations, bridges, and routers to use a network interface card to connect to a 1-Gbps network. The maximum distance obtainable for Gigabit Ethernet when transmission occurs using a 1330-nanometer (nm) frequency on single-mode fiber is 3000 meters [Ref. : Held, 1998]. Data transmission on 1000BASE-T Gigabit Ethernet using category 5 UTP cable has a maximum distance of 100 meters, as does 100 BASE-T Fast Ethernet.

There are presently only a very few organizations that can be expected to require the use of a 1-Gbps shared media network. However, the use of Gigabit Ethernet can be expected to play an important role in providing a high-speed network in the future.

### **4. Making the Technology Choice for the Design**

Based upon the need to have good results in network performance, all LANs in the Indonesian Eastern Fleet Network should be implemented as a Fast Ethernet (100 Base-T). This will provide a consistent approach and ensure that the network meets current needs while supporting future growth. Fast Ethernet has sufficient bandwidth to support an increase in network traffic and advances in network technology.

High-Speed Gigabit Ethernet 1000 Mbps is still not widely accepted and is too expensive to be implemented. Fast Ethernet is at the leading edge of Ethernet technology and offers significant advantages over 10 Mbps Ethernet. Fast Ethernet, operating at 100

Mbps, which is ten times faster than 10Base-T Ethernet, is a reliable LAN technology designed to meet high demands for network bandwidth. Network managers also benefit from Fast Ethernet by leveraging the familiarity of the underlying Ethernet technology and the protection offered for investments in applications, cabling, and management expertise.

Fast Ethernet delivers high performance and familiar technology. Another benefit arises from the fact that Fast Ethernet products are becoming increasingly inexpensive. For all of those reasons, Fast Ethernet 100 Base-T LAN is the most appropriate choice for the standard LANs architecture for the Indonesian Eastern Fleet Network. Implementation of Fast Ethernet 100 Base-T will provide a responsive and uniform network environment.

### **C. DEFINING THE LAN CONNECTION SYSTEM**

The local area network (LAN) is a communication network that interconnects a variety of devices for information exchange. Network nodes can consist of workstations with network interface cards (NICs), hubs, bridges, routers and servers. The idea of a shared medium is a key concept when planning a LAN. The infrastructure is the physical wiring of the LAN, over which all network devices communicate. A properly designed infrastructure can be flexible enough to support current and future networking needs. Cable and hardware infrastructure quickly become the primary limiting factors in most LANs.

Connections in the older networks were mainly 10Base2 (Thinnet), 10Base5 (Thicknet), category 3 (CAT- 3), unshielded twisted pair (UTP) and shielded twisted pair (STP). Modern local area networks use mainly category 5 (CAT-5) UTP cable. The

CAT-5 UTP cable is installed point to point between the workstation and the electronics that make up the network, such as a hub or a switch. The CAT-5 UTP cable terminates to an IDF, and an individual cable should not exceed 100 meters long. The CAT-5 UTP cable has four pairs of wires with a lay length of eight twists per foot. It is rated for signals of 100 MHz or less and supports 100 Mbps Fast Ethernet.

The fiber-optic cable connects all the electronic devices throughout the campus to an MDF. The MDF houses the enterprise category network equipment, such as switches capable of switching packets and routers with multiple ports connecting the enterprise together. Fiber-optic cable uses reflected photon (light) energy instead of an electromagnetic charge to transmit its signal. This makes it resistant to electromagnetic interference.

Since efficiency and cost are the main issues in implementing an effective local area network, it is recommended that any new cable installations use CAT-5 UTP cable for future growth. Installation of CAT-5 UTP where new cabling is required allows maximum flexibility for future expected requirements.

#### **D.    DEFINING NETWORK PROTOCOL**

Protocols are the system of rules and procedures that govern communication between two or more devices. Many varieties of protocols exist at all layers of the OSI model. Not all protocols are compatible, but as long as two devices are using the same protocol, they can exchange data. A network protocol is a set of language and set of rules that nodes agree to use to communicate over the network [Gregg, 1999]. When several computers are networked, the rules and technical procedures governing their communication and interaction are called protocols.

NetBEUI is not a routable protocol. It does not contain enough information to send packets from one network to another. NetBEUI is a network protocol that is used in all Microsoft networking products including MS-DOS and all versions of Windows and Windows NT. The NetBEUI protocol works well on old and lower-end computers running MS-DOS.

Internetwork packet exchange/sequenced packet exchange (IPX/SPX) is the network protocol that is usually used on Novell NetWare networks. However, it can also be used as the main protocol in a pure Microsoft network. IPX/SPX is not routable. It operates at the application and session layers of the OSI model.

Transmission control protocol/internet protocol (TCP/IP) is routable. It enables users to connect and communicate across networks that use different hardware architectures and run different operating systems. TCP/IP can be used to communicate on pure Microsoft networks, or on mixed networks with products such as IntranetWare and UNIX. TCP/IP provides reliable data delivery service by setting up end-to-end connections between two systems that need to exchange data. To do this, it establishes a virtual network between the two computers across all routers in the affected network. TCP uses the Internet Protocol (IP) as the transport to deliver information across the network. The main advantage of TCP/IP is its flexibility. Every operating system platform now supports it. TCP/IP is the default protocol for Unix and the preferred protocol for the NetWare and Windows operating system.

## CRITERIA FOR SELECTING NETWORK PROTOCOLS

Characteristics	NetBEUI	IPX/SPX	TCP/IP
Capability to transmit across routers	No	Yes	Yes
Best for corporate intranet	No	No	Yes
Best for large networks	No	No	Yes
Best for pure Microsoft networks (no routing)	Yes	No	Yes
Best for pure Microsoft networks (with routing)	No	No	Yes
Best for small LANs	Yes	Yes	Yes
Best for WANs	No	No	Yes
Ease of client configuration	High	Low	Low
Ease of network administration	High	High	Low
Interoperability with NetWare	No	Yes	No
Interoperability with the Internet	No	No	Yes
Interoperability with UNIX	No	No	Yes
Performance for application server (client/server)	Low	Low	High
Performance for file and printer sharing	Medium	High	Medium
Performance on small networks	High	Medium	Medium

Table 4. Criteria for Selecting Network Protocol [Gregg, 1999]

The Data Link Control (DLC) network protocol enables the network to communicate with certain network printers. The DLC protocol operates in the data link layer and corresponds to the logical link control (LLC) sublayer. When using DLC to communicate with a network printer, the DLC protocol need to be installed on the computer that is acting as the print server for the network printer. Other nodes that send jobs to the print server can use any standard protocol, and do not need to have DLC installed.

User Datagram Protocol (UDP) is a transport layer component that provides data delivery service in the TCP/IP protocol stack. UDP is a connectionless protocol and does not check to see if the packet arrived at its destination. This protocol is used to transmit packets that are time sensitive, or when it is not important to know if they have arrived at their destination. UDP is commonly used in audio and video applications.

## **E. CONFIGURING NETWORK COMPONENTS**

In the following sections, many of the key networking components are discussed that are likely to be considered in our network design process. Small and simple networks use only cables and network adapters attached to the computers and other devices. However, as the network grows in size and complexity, it needs other networking devices to tie everything together correctly.

### **1. Network Interface Card (NIC)**

The network interface card (NIC) is a layer 1 device and is the only device on the network that is actually installed inside the machine. Workstations, servers, print servers, and gateways all have NICs. NICs provide the connection point to a network. Each type of NIC is specially designed for a specific type of network such as Ethernet, Token ring, FDDI, or ARCNET. Newer NICs usually have RJ-45 connectors on them. A standard NIC would be a 10/100 Mbps PCI Ethernet card with an RJ-45 connector. Windows 95/98/ME and Windows NT 4.0 will auto detect most NICs. Before installing the card it is important to ensure that the latest driver is installed on the machine.

### **2. Hubs**

A hub is a layer 1 device that repeats a signal to all the hub ports that can connect to network segments or devices. A hub may have as few as 4 ports, 8 ports, 12, or 24 port models. The unit has female RJ-45 connectors on the front that may attach directly

to a computer by means of CAT 5 cable or it can attach to a patch panel with an RJ-45 patch cable. The connectivity with other devices is indicated by a link light at the front panel of the hub. A popular 10/100 autosensing Ethernet hub supports legacy systems and provides growth for greater speed. Hubs are a critical component in most networks, so we need to safeguard them to avoid network down time. In networks containing more than a couple of nodes, it is best to install the hub devices out of the way, preferably in a wiring cabinet or closet.

### **3. Switches**

A switch is a layer 2 device that separates a network into segments. It is essential for large Ethernet networks because it eliminates the collisions that are frequent with shared networks. Switches support hierarchical network designs and can connect different architectures. A switch repeats data but, unlike a hub, only to the recipient/port specified by the MAC address.

In a campus area networks, each device (end system) connects to a workgroup switch over a point-to-point CAT-5 UTP cable and shares the media with any other device. This allows for a full-duplex connection between the switch and the device. Workgroup switches are hierarchical in design. They are connected to individual workstations and also to a large enterprise switch. This large enterprise switch connects to Servers and to the WAN via the router. A switch can segment a network into its ports, and forward the packets between those ports at the same time (simultaneously).

### **4. Routers**

The router is used to connect to remote offices or the Internet and is installed as a device on the network. An Internet router is usually the gateway address in the TCP/IP

protocol parameters. It is an OSI layer 3 device that routes packets to the proper destination on the basis of the destination network address in the packet. A router will have one or more serial ports with a Channel Service Unit/Data Service Unit (CSU/DSU) connected to it and one or more LAN ports connected to a switch or hub. A router is configured with the local subnet address information and the address information of the router to which it is connected on the WAN port.

#### **F. SELECTING A NETWORK OPERATING SYSTEM**

There are several network operating system servers available, such as Windows NT 4.0 Server, Windows 2000 Server, Novell NetWare, and Windows 98/ME. Due to geographic separation of the organizational units and the high cost of training administrators, the capability to centrally manage the network is an important aspect of limiting the total cost of ownership. The advantages of using a Windows 2000 Server include increased flexibility, scalability, reliability, management capabilities and security. Migration to Windows 2000 provides a common operating system environment and meets the Indonesian Eastern Fleet recommendation on standardization.

Below are the features of network operating systems that are commonly used at the present time:

##### **1. Windows NT 4.0 Server**

Windows NT 4.0 Server is a full scale network operating system. Its robust security and management features make it a good candidate for medium and large size network environments, but it also requires the knowledge and the management of a network administrator.



Windows NT 4.0 Server is a genuine network operating system. Its services are especially optimized to give the best service for its clients and the Windows NT 4.0 Workstation can be used as a client side operating system. Windows NT 4.0 Server was designed from scratch to perform the roles of a real network operating system with features like preemptive multitasking, multiprocessing, multiplatform support, secure file systems and fault tolerance. A window NT 4.0 Server machine can play many roles in a network. It can be a file server, a database server, or a web server. It performs all of these duties with great success. Windows NT 4.0 Server's minimum hardware requirements are Intel Microprocessor 80486 or higher, 120 MB disk storage, 16 MB memory, and a VGA display or higher resolution. It also can support three kinds of Reduced Instruction Set Chips (RISC) microprocessors. These are MIPS, Digital Alpha, and Power PC Alpha with 150 MB minimum disk storage, 16 MB memory, and a VGA display or higher resolution.

## **2. Novell NetWare**

Novell NetWare is a widely accepted network operating system that has started to lose market share against the Windows NT Server. Novell NetWare 5.1 is specially designed for organizations that need a cost effective and reliable network operating system. In the file server role, it is accepted as the fastest server available for medium to large networks, but it only runs programs written for Netware.

The minimum hardware requirements for Novell NetWare are a 486 Based PC or above, 64 MB RAM, and at least 200 MB of free hard disk space.

### **3. Windows 98/ME**

Windows 98/ME is not designed to perform a server role but its rich network features make it very suitable for small-scale network environments. It also can handle 32-bit applications. Unfortunately, however, features like overhauling system security, multi-user environment support, and secured file system structures are weaker than the other operating systems. Windows 98/ME minimum requirements are 486/66 MHz based Computer/Processor, 16 MB of memory (RAM), 225 MB of available hard disk space, and a VGA or higher-resolution display.

### **4. Windows 2000 Server**

Windows 2000 Server is the newest version of Windows NT. Windows 2000 Server delivers powerful, comprehensive management services for managing the servers, networks, and client systems. Windows 2000 Server has an interoperability with existing systems by providing migration paths from any number of existing systems, devices, and applications. The minimum system requirements for Windows 2000 Server are as follows:

- 133-Mhz Pentium or higher central processing unit (CPU)
- A maximum of four CPUs per computer are supported
- 256 MB of RAM recommended minimum
- 128 MB of RAM minimum supported
- A hard disk partition with enough free space to accommodate the Setup process. The minimum amount of space required is 1 GB

Windows 2000 Server comes along with Active Directory, an Internet standards-based directory service that uniquely enables flexible policy-based management of systems. Active Directory is a directory service that is scalable, built from the ground up using Internet-standard technologies, and fully integrated at the operating-system level.

It allows a single point of administration for all published resources, which include files, peripheral devices, host connections, databases, web access, users, other arbitrary objects, services, etc [Microsoft, 1997]

Active Directory simplifies administration and makes it easier for users to find resources. Using Active Directory, hierarchical information structures can be built that make it easier to control such things as administrative privileges and also make it easier for users to locate network resources such as files and printers. Hierarchical information structures form a tree structure that reflects all organizational resources. Compared to Windows NT 4.0 that scales quite well up to 100,000 users, Active Directory can scale up to over one million users in a single domain by using indexing technology and advanced replication techniques to speed performance.

#### **G. DATA BACKUP SYSTEM**

The network administrator is responsible for creating a backup plan which assures that the organization can easily recover data if data security is breached. There are three methods used for backing up data and files on a network. These are differential backup or incremental backup, copy, and full backup. A differential backup, also known as incremental backup or daily backup, is used to backup selected files when the content of a file has changed. The backup system reviews the date and time of the file, which indicates the last time the file was updated and compares it with the file. If they differ, then the backup system copies the file. Otherwise, the file is not backed up. A copy backup is used to back up selected files. A full backup copies all the files on a server regardless of whether they changed or not since the last backup. The network

administrator chooses the backup method based upon the efficiency of the backup schedule and the capacity of the backup medium.

All backup software modules must be installed on a server to guarantee the quality of backed-up data. The magnetic tape backup can be used as a common type to provide an effective backup system for our network. A magnetic tape backup is reliable, inexpensive, and has enough capacity to backup the entire network on a single tape.

## **H. IMPLEMENTING THE NETWORK**

### **1. Standardization**

One of the most important aspects of implementing our LAN infrastructure is planning. It is necessary to ensure that every aspect of the implementation has been addressed. Implementation of the Indonesian Eastern Fleet LANs infrastructure begins by establishing standard network architecture to achieve compliance with the Indonesian Eastern Fleet network requirements, compatibility with the naval main bases and fleet units, and to establish an effective and highly reliable network. A standard architecture is needed to provide direction for information technology managers and to define the Indonesian Eastern Fleet information technology strategy.

The IEEE 802.3 Ethernet Network architecture, using Fast Ethernet (100 Mbps) technology, is designed to be implemented on the Indonesian Eastern Fleet's LANs infrastructure. The standardization of network architecture is a critical aspect to implementing an integrated network that is interoperable with other Indonesian Navy networks or with other branch services networks.

Ensuring hardware compatibility is important because each piece of hardware on the network must be able to communicate with other hardware on the network.

Minimum hardware requirements represent values that are sufficient only to allow the system to start. To obtain the best performance out of our network, the appropriate hardware compatibility that meets the Indonesian Eastern network's requirements and allocated budget needs to be determined.

## **2. System Administration**

There are three parts of IT support that make our information technology systems success: network operations, system administration, and install/configure/troubleshoot categories. IT support for information systems is a large part of the life cycle costs.

System administration in the Indonesian Eastern Fleet network should conduct a network operations center for monitoring and controlling the operation of our wide area network, and providing reports for a distributed system. A network operations center is responsible for day-to-day operation of the WAN. This accomplished through the monitoring of online statistics including traffic patterns, congestion reports and data from SNMP clients. Many software packages exist which aid in the recognition of network problem areas.

The right choice in selecting a network operating system determine how well the network operation supports distribution and gathering information all fleet units. The implementation of centralized management by using Windows 2000 network operating system is key to improving the Indonesian Eastern Fleet network system. This one step forward in computer communication systems by implementing effective LANs will improve the Indonesian Eastern Fleet information technology systems.

For effectiveness and efficiency, the network operations center (NOC) should be established in the Indonesian Eastern Fleet headquarters LAN in Surabaya.

Centralization is a good strategy to support information systems to all fleet units. The network operations center manages the Indonesian Eastern Fleet wide area network to ensure its up and run properly. However, all other LANs should also have their own network administration unit in each LAN that managed by a local network administrator. We still need decentralization to manage and maintaining the network locally in each LAN. The synchronization between all LANs and the Indonesian Fleet NOC would provide good result in network traffic management as we will prove and evaluate in our network design using EXTENDv4 simulation software program.

The Indonesian Eastern Fleet NOC responsible for communication with the Internet Service Provider, telecommunication carrier company, and contractors in order to obtain and maintain the good quality of the network. By default the role of the NOC falls to the information technology unit coordinated with command, control and communication unit to always provide good service and network maintenance to the network users.

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## **V. WEB-BASED WIDE AREA NETWORK DESIGN**

Local area network (LAN) is a convenient way to connect machines in a building or in a close proximity. Each location might have its own LAN, but these were isolated from the rest of the organization until someone figured out a way to connect them together into a wide area network (WAN). There are several transmission techniques that can be used, but the simplest is with a modem and a telephone line.

A WAN covers longer physical distances than a LAN. The WAN makes it possible to put the entire organization on the same network no matter how scattered its nodes. The network could be spread across a state, an island or around the whole country. Thus, it is possible for a military organization such as the Indonesian Eastern Fleet to put into operation their own wide area network tying together all naval units in the eastern territory of Indonesia. Implementing web-based technology on the WAN would greatly improve the efficiency of the Indonesian Eastern Fleet information systems.

### **A. REMOTE ACCESS SERVICE (RAS)**

Remote Access Service (RAS) provides the capability of dialing into our network from a remote location, and acting as a remote node on the network. RAS is often referred to as Dial-up Networking, which communicates with other devices in the telecommunication system using modem at each end of the connection. Both a RAS client and a RAS server require their own modems. The RAS server modem answers a call from a RAS client modem to establish the remote network connection.



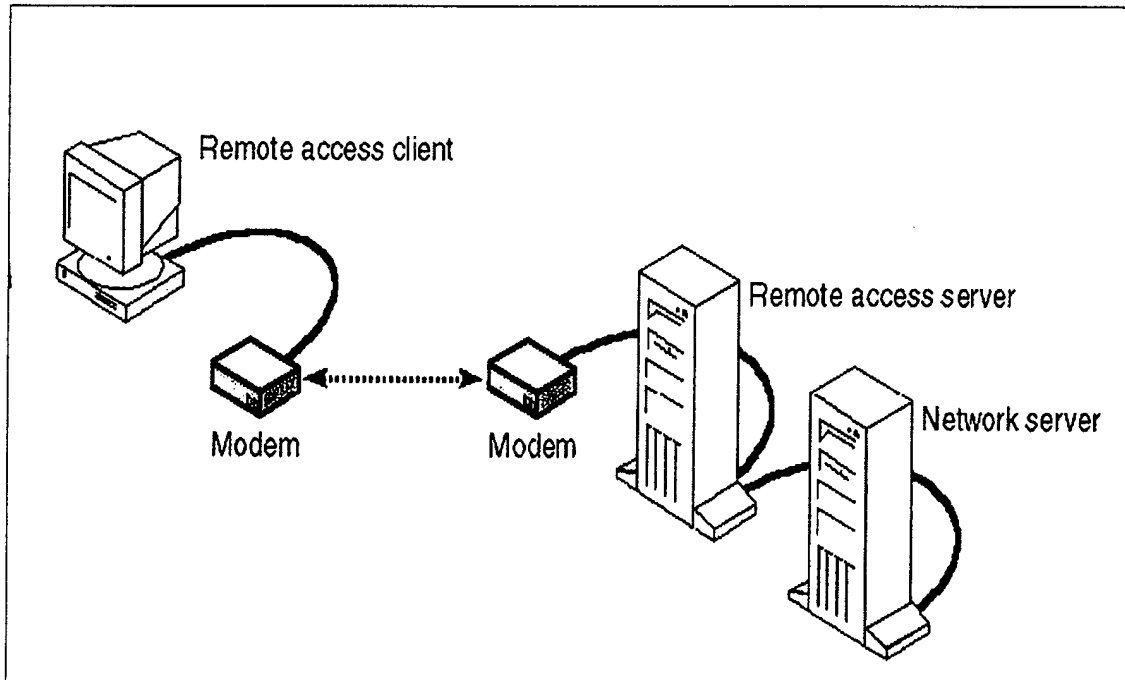


Figure 6. RAS Connection.

RAS supports three connection protocols: *Serial Line Interface Protocol (SLIP)*, *Point-to-Point Protocol (PPP)*, and *Point-to-Point Tunneling Protocol (PPTP)*. SLIP does not support dynamic IP addressing or NetBEUI or IPX protocols, it cannot encrypt logon information, and it is supported only by RAS clients. PPP overcomes many of the limitations of SLIP. It supports the IPX, NetBEUI, AppleTalk, and DECnet protocols. It also supports encrypted passwords. PPTP provides a way to route IP, IPX, or NetBEUI point-to-point protocol packets over a TCP/IP network.

Using a RAS connection is not always the best choice to achieve network expansion. RAS is used if it is determined that our bandwidth requirements are not greater than 128 Kbps, if a dedicated full-time connection is not required, or if system costs must be kept down. It is not good to use RAS if a higher bandwidth is needed than

that provided by an asynchronous modem or if a dedicated full-time connection is needed.

Virtual private networking (VPN) enables us to securely access our network across the Internet. RAS is very expensive if long-distance is used for access, especially if access is needed for lengthy periods. If there is an account on the Internet using a national ISP that provides unlimited access via local phone, there is a way to securely transmit data over the Internet, and make it all seem as if our network was directly dialed into. It uses Point-to-Point Tunneling Protocol (PPTP) to encase the data in a secure tunnel and transmits it over the Internet to its destination site. Like RAS, VPN uses Dial-up Networking to establish the network connection. VPN can also be used over dedicated analog lines to maintain a permanent network connection to the Internet – and between our organization's websites.

## **B. CARRIERS**

### **1. Analog Telephone lines**

A modem is useless unless it can communicate with another component. All modem communication takes place over some kind of communication line. There are two types of analog telephone lines that can be installed as a modem's carriers for our network: *dial-up connection telephone lines* and *dedicated (leased) telephone lines*.

In *dial-up connections* each session requires that our modem dial a phone number to establish a new session. They are slow and can be unreliable for transmitting data. The quality (speed and reliability) of a session is only as good as the telephone network circuits connected for that particular session. The longer the distance covered by the connection, the less consistency seen in the quality from one dial-up session to the next.

However, for some organizations it may be practical to temporarily use a dial-up communication link between sites for a certain amount of time each day to transfer files and update databases.

*Dedicated lines* provide full-time, dedicated connections that do not use a series of switches to complete the connection. The quality of the line is often higher than the quality of a telephone line designed for voice transmission only. They typically range in speed from 56 Kbps to 45 Mbps or more. PT. TELKOM and PT. INDOSAT, Indonesian telecommunication state-owned companies, provide long distance connection across the sea to the entire country using a satellite system. A leased analog line is faster and more reliable than a dial-up connection. However, it is relatively expensive because the carrier is dedicating resources to the leased connection whether or not the line is being used.

## **2. Digital Lines**

Organizations can turn to digital data service (DDS) lines when requiring faster and more secure transmissions than analog telephone lines provide. The primary advantage of digital lines is transmissions over them are nearly 99 percent error free. Digital lines are available in several forms, including DDS, T1, T3, and switched 56. Since DDS uses digital communication, it does not require modems. Instead, DDS sends data from a bridge or router through a device called a Channel Service Unit/Data Service Unit (CSU/DSU). This device converts the standard digital signals that the computer generates into the type of digital signals (bipolar) that are part of the synchronous communication environment. Either analog lines or digital line is a point-to-point links. We use circuit switching network (PSTN, ISDN) over these telecommunication origin

lines, and we use packet switching network (Frame relay, ATM,) over the T1 and T3 lines.

### **C. WIDE AREA NETWORK LINK OPTIONS**

LANs are not adequate for all fleet units communications. There must be connectivity between LANs and other types of environments. Using components such as bridges and routers, along with communications service providers, a LAN can be expanded from an operation that serves a local area to encompass a wide area network. Most WANs are combinations of LANs and other communications components connected by communication links called WAN links. WAN links can include: packet-switching networks, fiber-optic cable, microwave transmitters, satellite links and cable television coaxial systems.

LAN connectivity and communications in an integrated WAN will involve one of the following transmission technologies:

#### **1. Public Switched Telephone Network (PSTN)**

Circuit Switching is used in telephone networks. In a circuit-switching network, a dedicated communication path is established between two stations through the network. Data generated by the source station are transmitted along the dedicated path as rapidly as possible. At each node, incoming data are routed or switched to the appropriate outgoing channel without delay.

The same network that our telephone uses is available to computers. One name for this network is the Public Switched Telephone Network (PSTN). PSTN is the most common communication service available in the world, including Indonesia. PSTN channel has  $W$  (bandwidth) = 4 KHz,  $S/N$  (Signal to noise ratio) = 30 dB or ratio 1000 : 1,

and C (maximum data rate) = 40 Kbps. The fact that the PSTN was designed primarily for voice-grade communication makes it slow. Dial-up analog lines require modems that can make them even slower. Since the PSTN is a circuit-switched network, the connection quality is inconsistent. Any single communication session will be only as good as the circuits linked for that particular session.

## **2. Integrated Services Digital Network (ISDN)**

ISDN was the circuit switching that designed to be the digital successor to the existing public switched telephone network (PSTN). As a dial-up services, ISDN requires a basic monthly fee based on connect time or the volume of data transmitted. However, as computer and telecommunication systems improved, the telecommunication carrier cooperated with the Internet Service Provider (ISP) companies to provide the ISDN lease services. In that case, it is necessary to pay more than the regular dial-up ISDN service. ISDN is a standardized telecommunications network architecture providing multi-channel, integrated end-to-end connectivity. It is one of the concepts developed to answer the demands of universal services: transmission of voice, video, data, facsimile, image, and graphics information over digital channels.

Traditional data transmission uses a modem to convert data for the analog channel. With ISDN, digital data transmission does not need to be converted. An ISDN channel consists of 64 Kbps data channels (B=bearer) and 16 Kbps packet signaling channels (D=delta). Services are offered as a basic rate 2B+D (two B channels and one D channel), or a primary rate 23B+D (23 B channels and one D channel). ISDN is offer by Telkom Ltd., Lintas Arta Ltd., and Info Asia Ltd. in Indonesia using a transmission

data rate of 128 kbps, and transmitted through all over the country across the sea using satellite systems by Indosat Ltd. (state owned company).

### **3. T1 Line**

T1 is the high-speed digital line that uses two-wire pairs (one pair for transmitting, and the other for receiving) to transmit a full-duplex signal at a rate of 1.544 Mbps. It can be used to transmit digital voice, data, and video signals. T1 line is made up of 24 distinct channels and samples each channel 8000 times per second. Using this method T1 can accommodate 24 simultaneous data transmissions. Each channel sample incorporates eight bits. Since each channel is sampled 8000 times per second, each of the 24 channels can transmit at 64 Kbps. This data rate standard is known as DS-0. The 1.544 Mbps rate is known as DS-1. DS-1 rates can be multiplexed to provide even greater transmission rates, known as DS-1C, DS-2, DS-3, and DS-4.

### **4. T3 Line**

T3 is a digital leased line similar to T1, but it operates at much higher data rates. T3 line is achieving data rates up to 45 Mbps. The cost of T3 line is much more expensive than T1 line. A T3 line represents a bandwidth equal to about 672 regular voice grade telephone lines, which is wide enough to transmit full motion, real-time video, and very large databases over a busy network. A T3 line is typically installed as a major networking artery for large corporations and universities with high volume network traffic.

### **5. OC-3 Line**

OC-3 is the ideal solution for customers who seek ultra-fast connectivity for their mission-critical Internet needs. OC-3 connection line operates at 155 Mbps bandwidth

using fiber optic cable. This reliable, high-speed service is ideal for Internet Service Providers, large content providers, search engines, and Web hosting.

#### **6. OC-12 Line**

For the ultimate in high-speed connectivity, we can choose OC-12 service. Users obtain greater bandwidth flexibility with a 622 Mbps connection. OC-12 service allows customers to sustain numerous simultaneous users on their corporate Web sites and provides users shorter download times. Customers currently using OC-3 service can expand their bandwidth by simply upgrading to OC-12 service, rather than ordering multiple OC-3 lines.

#### **7. OC-48 Line**

OC-48 operates at 2.4 Gbps. OC-48 fulfills the growing need to service hand-offs in the backbone space with industry leading in-service velocity and reliability. OC-48 connection had robust reliability. It can be used to support a long distance intercity telephony trunks and as large campus backbone.

#### **8. OC-192 Line**

OC-192 delivers up to 9.6 Gbps of capacity, the highest fiber capacity commercially available in the marketplace. Having provided over 90% of the industry's 10Gbps multi-wavelength systems, OC-192 is the leading high-capacity optical networking system in the world. OC-192 delivers a virtually error free end-to-end bit error ratio of 10<sup>-15</sup>, a competitive edge for networks that carry mission-critical data traffic. OC-192 is the reliable connection line at the present time. This connection line is still not offer by network provider and telecommunication companies in Indonesia.

## **9. The Analysis of WAN Connection Options**

The array of WAN connection choices available will be trimmed down based on our region and what services our telecommunications carrier provides. Once we know what is available, the selection boils down to our specific application and its cost. The issues behind WAN connection options are transmission data rate, capacity, and cost.

Analysis of the WAN connection options:

- PSTN. The cost of PSTN is very cheap. However, the reliability is very low compare with other services. PSTN connection service use modem communication and it is very slow.
- ISDN. This connection service operates fast enough to link all LANs in the Indonesian Eastern Fleet WAN effectively. The reliability is good; the network provider is responsible for transmission error. The cost is inexpensive and meets the network low cost requirement.
- T1 Line is more expensive compare to PSTN or ISDN but it is fast and reliable and can be used for connecting the Indonesian Eastern Fleet WAN effectively
- T3 Line is an advanced network connection technology that operates at 45 Mbps, much faster than T1 line. However, the costs is much more expensive than T1 line.
- OC-3 connection line is a high speed and secure service based-on fiber optic cabling system. High speed data transfer is possible due to the virtually unlimited bandwidth of fiber optic. However, this connection service is very expensive.
- OC-12 line is faster than OC-3. It operates on fiber optic cable at 155 Mbps. Fiber optic cable also makes our network secure and is considered to be virtually error free. The cost of this connection is more expensive.
- OC-48 line is much more expensive than OC-12 and operates at 2.4 Gbps. It is an emerging technology based on fiber optics. It is highly reliable but is very expensive.
- OC-192 is the newest connection line with a very high speed transmission. However, this connection line still not offered by the network provider in Indonesia at the present time.

The main goals in making technology choices for the Indonesian Eastern Fleet WAN design in this analysis are low cost, effectiveness, and efficiency. From the array



of analysis we come to conclusion that ISDN is the most appropriate choice for the Indonesian Eastern Fleet WAN design. ISDN meets the Indonesian Eastern Fleet network requirement for low cost, reliability, and capacity. We recommend that eventually, as finances permit, the Indonesian Eastern Fleet migrate to T1 Lines 1.544 Mbps for its WAN connection service. This fully digitized channel will answer the demands of multirate signal voice, data, video, image, and graphic information.

#### **D. WAN CONNECTIVITY DESIGN**

##### **1. Connecting LANs to the Internet in a Packet Switching Network**

A WAN is constructed from many switches to which individual routers connect. The initial size of a WAN is determined by the number of sites and the number of computers connected. The basic electronic switch used in a WAN is called a packet switch because it moves complete packets from one connection to another. A packet switch contains two types of input/output (I/O) connectors: one type is used for other packet switches, and the other is used to connect to computers. In packet switching, packets are relayed through stations in a computer network along the best route currently available between the source and the destination. Each packet is switched separately.

Wide area network interfaces are incorporated into remote bridges that are designed to provide an internetworking capability among all geographically dispersed LANs linked by a WAN. ISDN connection service links all LANs in the Indonesian Eastern Fleet WAN. The basic concept behind ISDN is end-to-end digital connectivity, or a completely digital signal all the way from the sender to receiver and vice versa. The Cisco 1003 ISDN router connects remote sites with Ethernet LANs to a WAN using ISDN at speeds up to 128 Kbps; with 4:1 data compression, raw throughput speeds up to 512 Kbps [Ref. Tittel, 1996]. The Cisco 1003 has a built-in ISDN Basic Rate Interface

(BRI) port, a 100Base T Ethernet port, a console port, and an external Personal Computer Memory Card International Association (PCMCIA) slot for a Flash ROM card. This plug-and-play product is designed to be installed easily by non technical personnel at remote sites. The Cisco 1003 ISDN router supports two software feature sets, based on the Cisco Internetwork Operating System (Cisco IOS). One set includes IP routing and transparent bridging. Both software sets support Point-to-Point Protocol (PPP), compression, dial-on-demand routing (DDR), and a host of other powerful features for optimizing WAN bandwidth and cost. Figure 7 illustrates the Ethernet Backbone and Internet Connection configuration for the Indonesian Eastern Fleet Network.

## **2. WAN Connectivity Plan**

Figure 8 is a map of the eastern region of Indonesia in which all naval units of the Indonesian Eastern Fleet conduct daily sea operations to maintain sovereignty and law enforcement at sea. Figure 9 shows our "WAN connectivity plan" designed to link all Fast Ethernet LANs in the Indonesian Eastern Fleet network using ISDN connection service as an integrated web-based WAN.

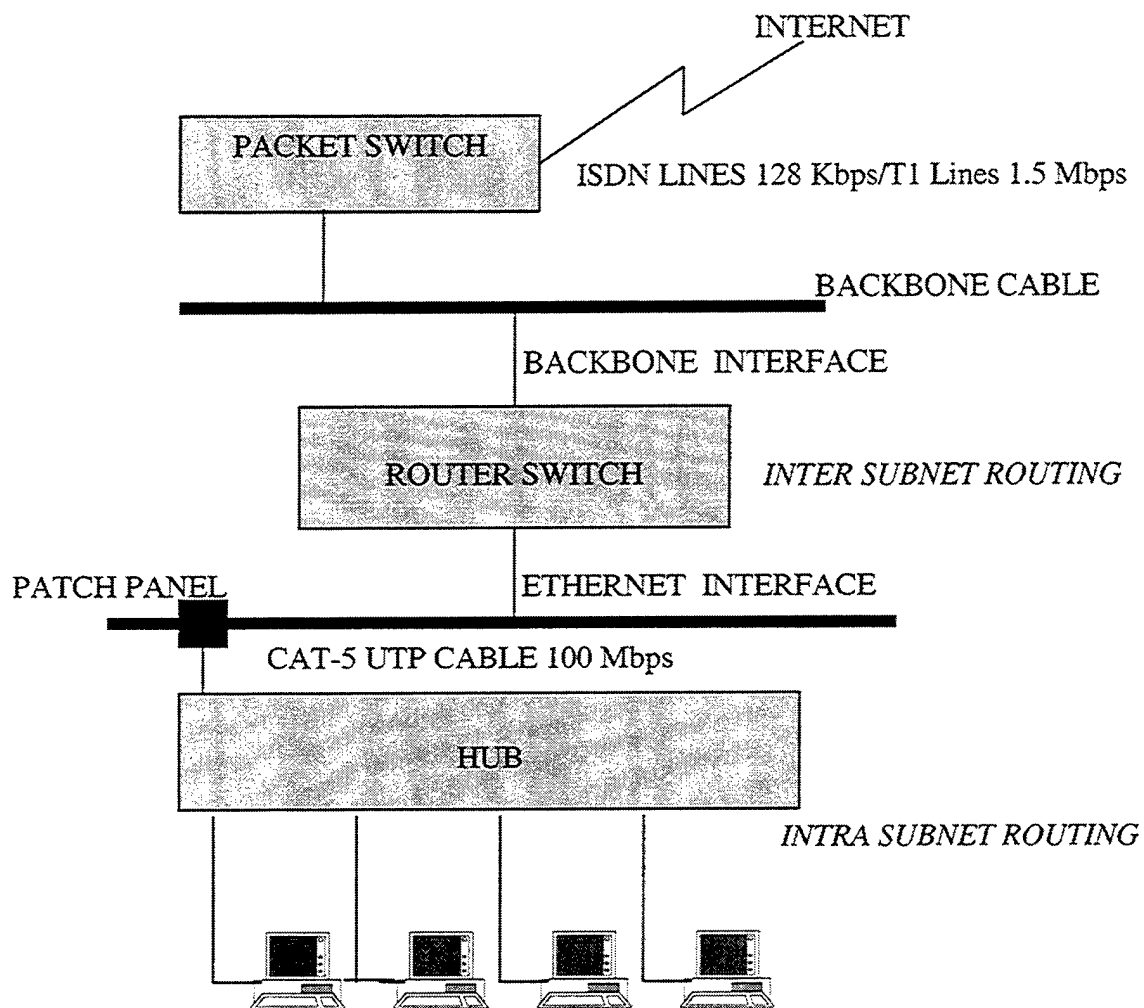


Figure 7. Ethernet Backbone and Internet Connection.

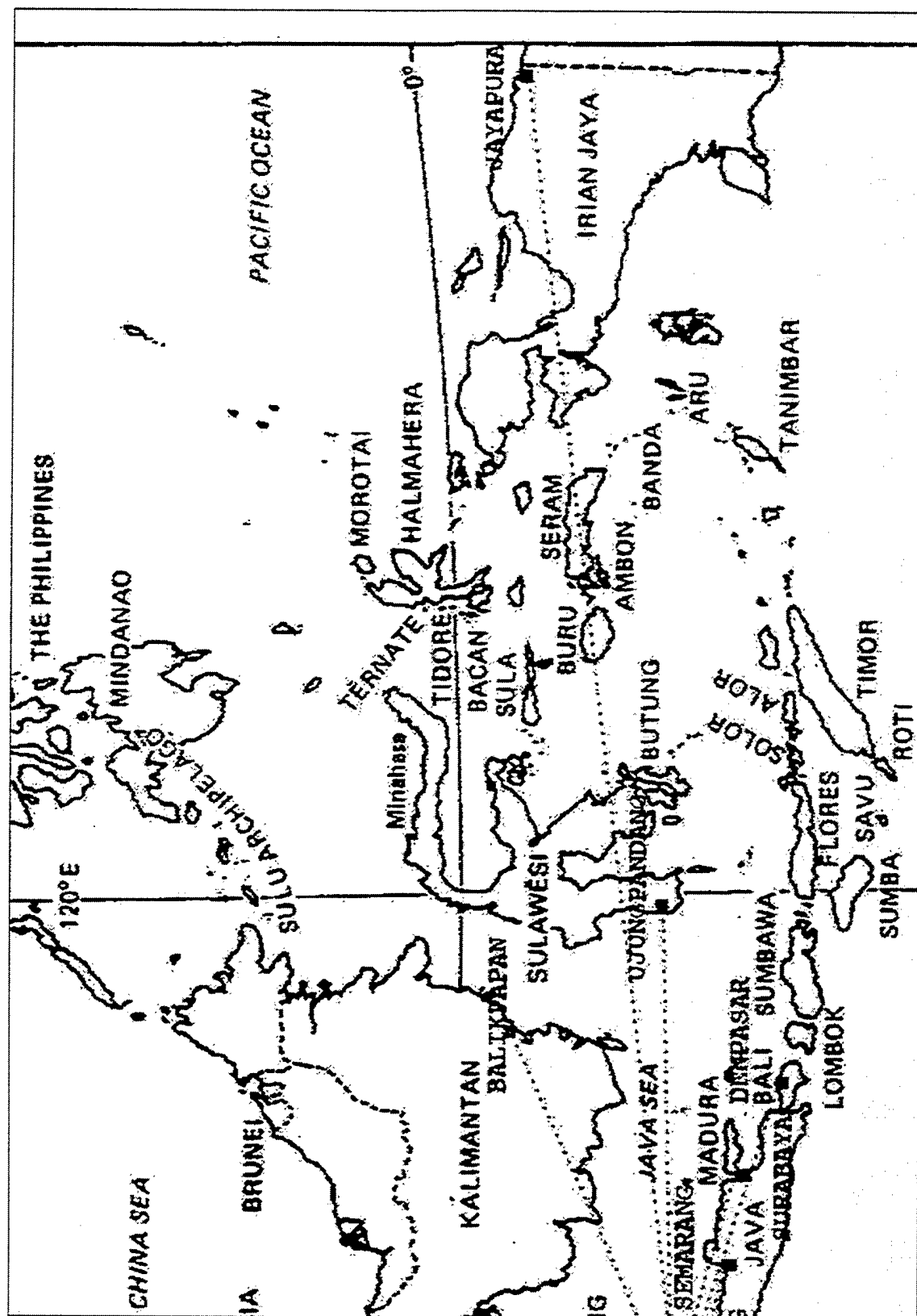


Figure 8. The Indonesian Eastern Fleet Regional Map.

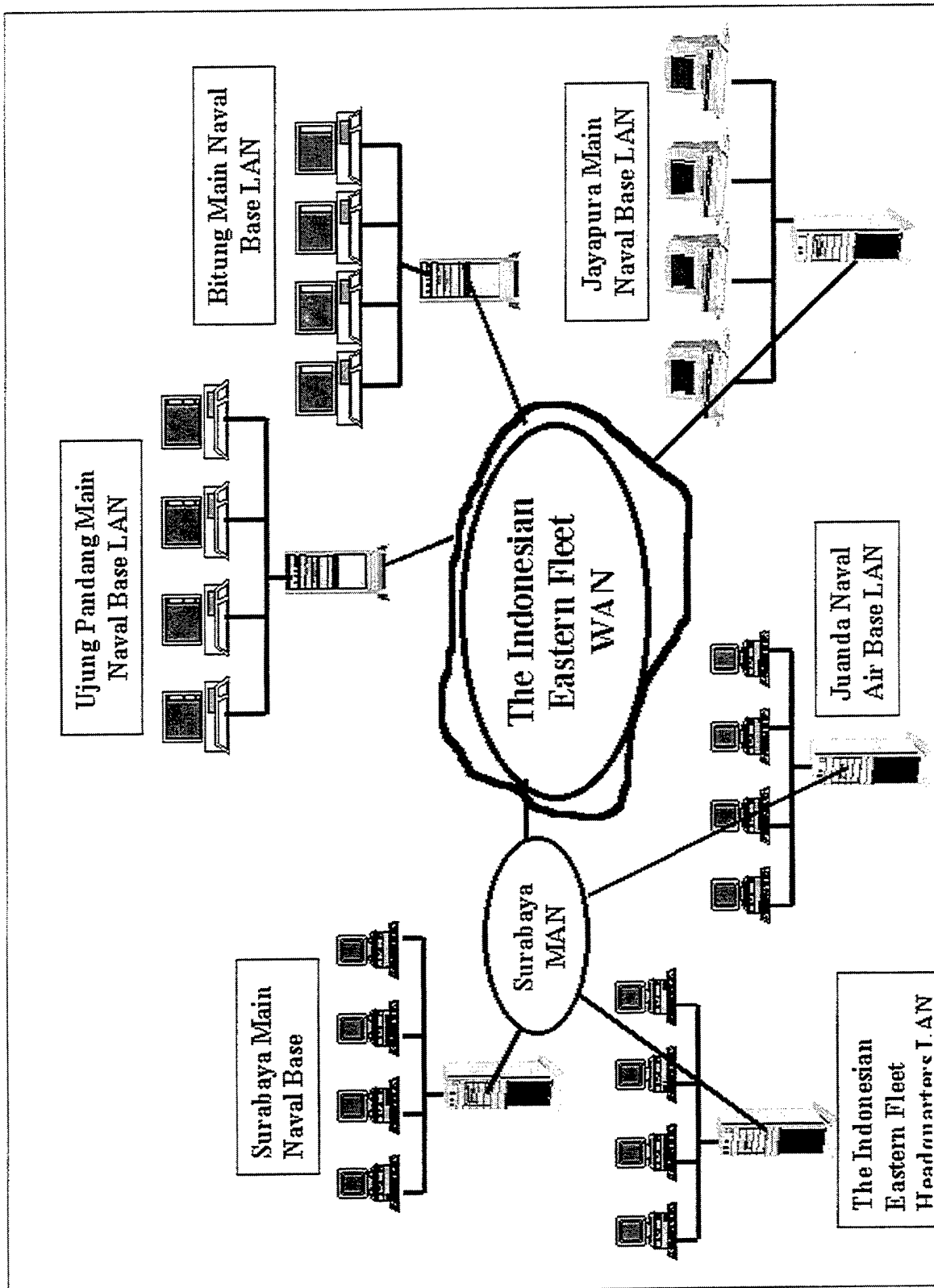


Figure 9. WAN Connectivity Plan

## **H. WIDE AREA NETWORK OPERATING SYSTEM**

As mentioned in the previous chapter, Windows 2000 Server is the appropriate choice for the Indonesian Eastern Fleet's web-based WAN operating system. It integrates user's desktops with the Internet, thereby removing the distinction between the local computer and the Internet. Windows 2000 Server includes Microsoft Internet Information Server (IIS 5.0), a secure Web-server platform used to host Internet Web sites on network servers.

Windows 2000 Server ensures network security by authenticating users before they gain access to resources or data on a computer or the network. It provides local auditing for files, folders, printers, and other resources.

Networking and communication services are the main goals of the Indonesian Eastern Fleet network. Windows 2000 Server provides built-in support for the most popular network protocols, including TCP/IP and IPX/SPX. It provides dial-up networking, which lets mobile users connect to a computer running Windows 2000 with the capability of 256 simultaneous sessions.

## **I. WEB SERVER**

Web servers make information available on a computer connected to the Internet, and web browsers show us information stored on a web server over the Internet. A web server receives requests for information from a client via the Internet and after processing these requests and checking their validity, retrieves or generates the desired information and transmits it back to the client. Every computer on the Internet that contains a web site must either have a web server or upload the web site files to a computer that has a web server.

## **1. Web Server Software**

Most large network systems use an Apache server while the smaller systems primarily use Microsoft's Internet Information Server 5.0 (IIS 5.0). The Apache server delivers the ultimate in flexibility and extensibility. Its modular design allows a Web administrator to build an application-specific binary, especially for the requirements of that installation.

Considerations in choosing a web server include how well it works with the operating system, its ability to handle server side programming and publishing, search capability, and web site construction tools that may be included. The software to be used for a web server is closely related to the hardware platform that will host the web server. Microsoft provides IIS 5.0 bundled with Windows 2000 Server, which means that we do not have to purchase it as an additional software package. IIS 5.0 is a high performance web server containing many improvements compared with the previous IIS versions. In addition, IIS 5.0 provides performance application protection security enhancements. For these reasons IIS 5.0 is the most appropriate web server for the Indonesian Eastern Fleet network.

## **2. Web Browser Software**

A web browser is a program that is used to view and to access web pages that exist on various web sites. The web browser has the job of processing received pages, parsing HTML code, and displaying the page to the user. The browser will attempt to display graphics, database tables, forms, formatted text, or whatever the page contains. The most popular web browsers now in use are Microsoft Internet Explorer, Netscape Navigator, and Mosaic. The types of computing platforms we use can influence the

selection of an appropriate browser. So, first we have to check the operating systems that run under the respective hardware platforms and the versions we need. Another consideration is the browsers' Java-capability. It is better to test web pages using multiple browsers to ensure the final output appears as intended.

### **3. Middle ware Network Protocol**

A necessary aspect of setting up an Internet environment in a company is to select a specific protocol for use on the corporate network. The protocol that is widely used for Internet technologies is known as the Transmission Control Protocol/Internet Protocol (TCP/IP). This protocol can operate on Ethernet local area networks, on various Wide Area Networks (WANs), and even over standard telephone lines that are connected to a modem.

### **4. How Web Browsers and Servers Work**

The basic task of a web browser is to retrieve a web page from a specific location in cyberspace then display the page according to the rules of HTML. The Uniform Resource Locator (URL) of a web page is its address on the net. Another program, known as a web server, is waiting at this address. When a user types a URL into a web browser, the browser "travels" to the address and "asks" the web server for the desired web page. If the server has the page, it "gives" it to the web browser via a TCP connection. The web browser then displays the page to the user. In the client/server programming model a server awaits and fulfills requests from client programs in the same or other computers. A given program (application) in a computer may run as a client which requests services from other programs and as a server of requests from other programs.



## **J. APPLICATION SERVER**

There are some choices of application server such as IBM WebSphere Application Server 3.02, Oracle9i Application Server, Netscape Application Server and ColdFusion that commonly used at the present time. Application servers provide the foundation for integrating browser, server, and database technologies into web applications. It gives developers a tool for creating dynamic web applications and interactive sites.

ColdFusion uses a flexible server-side markup language that seamlessly integrates with HTML called ColdFusion Markup Language (CFML). CFML gives the ability to control the behavior of applications, integrate a wide range of server technologies, and generate the content that is returned to the web browser. When a page in a ColdFusion application is requested by a Web browser, it is automatically pre-processed by the ColdFusion Application Server. Based on the CFML in the page, the Application Server executes the application logic, interacts with other server technologies, and then generates an HTML page and returns it to the web-server. The web-server returns the page to the user's web browser.

IBM WebSphere Application Server is an e-business application deployment environment built on open standards-based technology. We can use Java servlets, JavaServer Pages and XML to quickly transform static web sites into vital sources of dynamic web content. IBM WebSphere Application Server offers qualities of service such as scalability, performance, security, and availability.

We also can build and modify web-sites and applications using Oracle9i. We can create personalized portals, manage and secure our website infrastructure.. Once our

Web site is deployed, Oracle9i Application Server has built-in reporting and ad-hoc query and analysis functionality to derive business intelligence. This enables us to make rapid and accurate decisions to improve operating efficiencies.

Considerations in defining an application server include how well it works with the operating system (Windows 2000) to meet the Indonesian Eastern Fleet network requirements in effectiveness and efficiency. One advantage of Cold Fusion is that a developer does not need to know any scripting language to be able to create effective Web database applications. The tags that start with CF prefix are Cold Fusion tags. The Cold Fusion Server handles these special tags. For the purpose of this network design the author suggest the Indonesian Eastern Fleet network use ColdFusion Server 4.5 Professional running on Windows 2000 Server with Internet Information Server 5.0.

#### **K. DATABASE SERVER**

IBM DB Universal Database, Microsoft SQL Server 2000, and Oracle Database are the widely used database server software in most corporate and organizations at the present time. Databases simplify the collection and maintenance of data and facilitate querying and displaying data in a wide variety of formats. Using tables, a lot of information that is related in simple or complex ways can be organized and managed.

Since we chose Windows 2000 Server as our network operating system, we can use Microsoft SQL Server 2000 as the database server software for the Indonesian Eastern Fleet network. SQL 2000 server has good support for Web standards and systems management. Microsoft SQL 2000 is robust and can be use properly in large or medium network such as in the Indonesian Eastern Fleet network. It also offers users an

XML environment and a data mining feature in Analysis Services which can be used to discover information in OLAP cubes and relational databases.

## **L. MANAGING THE WIDE AREA NETWORK USING WEB-BASED TECHNOLOGY**

### **1. The Advantages of Using Web-Based Technology**

The Internet is a global grid of networks enabling computers to directly and transparently communicate and share services throughout much of the world. Using a computer and an Internet Service Provider (ISP) connection, we can get access to the entire worldwide public data network without restriction. If we have the proper equipment on our computer, we can also provide information to the rest of the world. Web based information systems help unify all forms of documents, data, sound, pictures, movies, messages and computer applications in ways we never imagined before [Ref. Harler, 1999]

An effective and efficient network will provide reliable information systems as required to support the Indonesian Eastern Fleet operations. Web-based technology gives the advantages by providing efficiency to achieve the main goal of the Indonesian Eastern Fleet. Various operating systems are used in diversified Indonesian Eastern Fleet office units, including Windows 3.1/ 95/98/ME and Windows NT 4.0/Windows 2000. Using Web-based technology, a variety operating system can be linked together. Web-based technology is designed for use in a networked environment, containing desktop computers using various operating systems. It is device-independent and works well in a cross-platform environment. The main requirement is that the network supports TCP/IP communications.

Web-based technology can be used productively for improving communications between widely separated work groups-especially those that operate on interconnected LANs spread across the sea in the entire eastern fleet region. Connectivity is the key word in using web-based technology. Its ease of access provides the ability to get to key management sites from anywhere in the eastern region. The use of web-based technology makes it possible for the Indonesian Eastern Fleet to save money and operate their units more efficiently by letting widely dispersed desktop computers share mission essential resources.

## **2. Network Management**

The main goal in managing the WAN is to control, monitor, and run the network in such a way as to insure its proper operation. We must attain a reliable end-to end service to ensure the network users share information and transfer data. Network management system are divided by the International Organization for Standardization (OSI) into five functional areas:

- Fault management
- Performance management
- Configuration management
- Accounting management
- Security management

Fault management is the function of detecting, isolating, and correcting faults in the system. The network manager has the ability to quickly detect problems and initiate recovery procedures. Fault management is very important because time is a critical factor in supporting information systems to all naval units via the network.

Performance management is the function of monitoring and controlling the system's resources. Managers have to monitor and control that the network has the capacity to accommodate users' needs using performance management tools. Performance can be measured by error rates, percentage utilization, overall throughput, and response time.

Configuration management is the function of manipulating hardware and software while still maintaining the system. It is the process of keeping in touch with all network devices. Configuration management helps the network manager to compare the running configuration with that stored in the system.

Accounting management is the function of tracking the system's resources and charging them to users. Accounting management gathers network statistics to help the network manager makes decisions regarding the allocation of network resources.

Security management is the function of protecting the system from human error, direct probing, subversion, penetration, and abuse of authority. It adopts proper encryption techniques and security logs.

The network manager is able to communicate with element of the network and monitor and control the running network by using network management protocols. The network management protocol most commonly used to manage a WAN is Simple Network Management Protocol (SNMP). SNMP is widely used and many vendors of network components design their products to support SNMP. It provides the tools needed to gain management information from the network, and is conform to the OSI seven-layer model. SNMP combines:

- Management Information Base = MIB. It is a database of configuration and statistical information on the network device. MIB collects all the objects that SNMP can manage.
- A Management station
- A management agent. The management agent is resident in the network components such as hubs, bridges, routers, and hosts, providing the management station with important information.

SNMP exchanges network information through messages (Protocol Data Units = PDU) that can be seen as an object containing variables with both titles and values. The operation of SNMP can be broken into three basic commands: *get*, *set*, and *trap*. These commands utilize the MIB to obtain and manipulate data pertaining to objects. *Get* allows a manager to obtain data from an object. *Set* allows a manager to change or update data from an object. *Trap* sends data automatically from an object to a manager when certain thresholds are exceeded. Through the use of MIBs, SNMP agents can be installed that allow managers to monitor specific objects. SNMP has the advantages of its simple design and ease to implementation in large networks.

Besides SNMP there are some other network management protocols such as Remote Network Monitoring (RMON), and Switch Monitor Management Information Base (SMON).

### **3. Web-Based Network Management**

In order to use the WWW infrastructure for network management, Hyper Text Transport Protocol (HTTP) is used as an interface layer between the devices that use SNMP. HTTP servers provide information that can be retrieved by web-browsers using HTTP protocol. HTTP is a stateless information retrieval protocol based on a TCP/IP suite. The retrieved information can be specified in several formats including graphics, text, binary, and Hyper Text Markup Language (HTML). HTTP does not replace such

network protocols as SNMP. In order to manage network resources using HTTP it is necessary to have an application which speaks both HTTP and SNMP. This can be achieved in two ways by extending standard HTTP servers and creating a proxy application which allows it the issue of SNMP protocol requests using HTTP. It is relatively easy to implement since the HTTP server transparently handles the HTTP protocol. Existing character-based network management applications can easily become Web-aware since it is straightforward to enrich the textual output with HTML tags.

Web-based network management using Java is common and widely used at the present time. The Java management application programming interface (JMAPI) supports SNMP and is based around the Java programming language. It takes the advantage of the same extensions and capabilities of Java. It consists of a manager browser in the Network Management System (NMS), and an intelligent Java engine in the agent. The manager browser monitors and controls network elements in the network. The communication between the NMS and the agent is carried out by Java classes using TCP sockets.

Web-based Enterprise Management (WBEM) is another model that merges SNMP with HTTP. WBEM is an initiative based on a set of management and Internet standard technologies developed to unify the management of enterprise computing environments. It provides the ability for the industry to deliver a well-integrated set of standards-based management tools leveraging the emerging web technologies such as HTML and XML. WBEM facilitates the use of the same terms and formatting in management applications so that the applications can communicate and users can more

easily compare information from different application and devices. It comes with three elements:

- HyperMedia Management Protocol (HMMP): an object-oriented management protocol implemented on top of HTTP
- HyperMedia Object Manager (HMOM): a data model to incorporate different information sets
- HyperMedia Management Schema (HMMS): an object oriented data model for representing the managed environment

#### **4. Implementing WBEM**

The smoothly run wide area network is essential to the operation of the Indonesian Eastern fleet mission critical. We cannot tolerate a lot of down time occurred in our network system. Therefore, network management is a fundamental requirement of our network. The network management keeps our network devices up and running.

SNMP and the network management consoles including WBEM are useful tools. In order to implement WBEM in our network we have to have management agents reside in all network components. We can use HP OpenView to help us manage our network by giving a clear view of its components, including not only hardware such as routers and hubs, but SNMP objects such as applications and databases as well. We should create customized views to reflect our organization's information needs. Performance and trend reporting show us in real-time how our systems are performing. Using HP OpenView as a network management tool allows the management agents reside in the network components such as hubs, bridges, routers, and hosts. A management agent plays an important role in network management systems by providing the management station with important information. Our legacy gear such as radio transmitter would also have agents in them. Further, our telecommunication stuff such as ISDN switches would have



telco-proprietary management interfaces using the functionalities of HP OpenView network management tool.

The implementation of WBEM needs tools that identify and solve performance problem of our network. The tools must monitor, diagnose, trend and even predict server performance. HP OpenView delivers integrated tools to solve those performance problems. In addition to managing devices like routers, bridges, and hubs, the HP OpenView Extensible SNMP Agent allows us to manage applications, printers, users, and databases that are central to business success. Network managers can configure new SNMP objects without programming. With support of all types of management information base (MIB) objects, we can completely customize network and systems management to include objects that meet our needs.

Web-based network management systems using the functionalities of complex platforms such as HP OpenView allow managers to specifically obtain or manipulate the desired information by simply typing the required data sets. Web-based interfaces can supplement the network management system by allowing managers to access information in another format on top of such products as HP OpenView by simply selecting an option in OpenView's drop down menu.

The use of a web-based network management tool provides the ability to manage objects directly from a web-based management station. The web-pages are accessed via an ordinary web browser, such as Internet Explorer or Netscape Navigator, that interfaces with HP OpenView-Network Node Manager (HP-NNM). HP-NNM manages objects on the network and would feed the status of the objects via MIBs.

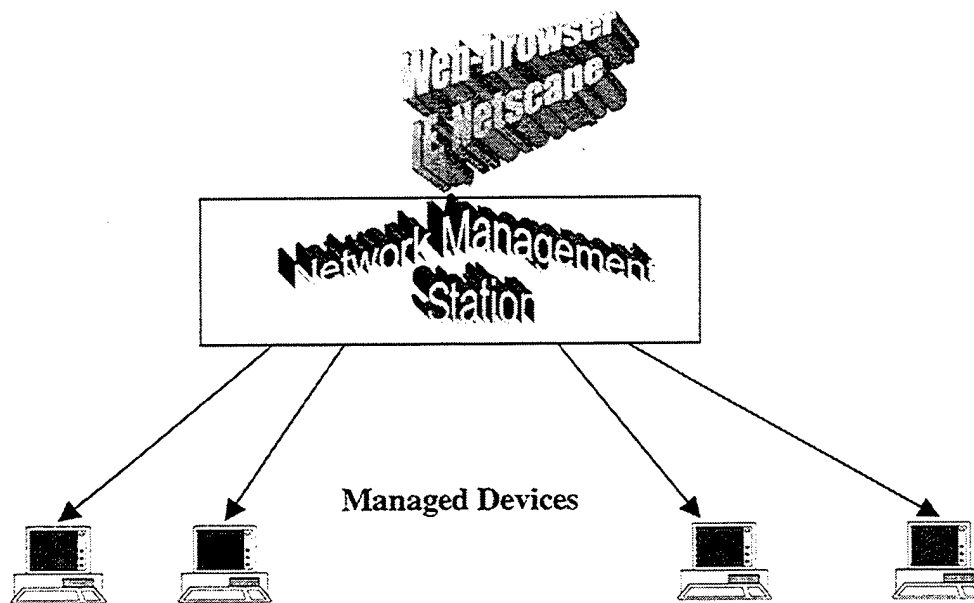


Figure 10. Web-based Network Management

By using “automated device discovery and layout” HP-NNM discovers TCP/IP and layer 2 devices on both LANs and WANs and presents this information in a graphical format. It continuously monitors the network for new devices and for the status of previously discovered equipment [Green, 1999]. It also has user interface based on Java™ that provides easy access to network maps and enables management of data from anywhere on the web. The purpose of its map is to illustrate the structure of the network and the status of devices and segments.

WAN connectivity can be achieved in a manner which optimizes economy and design. The management and maintenance of the Indonesian Eastern Fleet network is simplified through standardization. Simple Network Management Protocol (SNMP) clients and WAN management applications using HP OpenView are valuable tools to assist personnel in the management of a WAN. The web has emerged as a new paradigm in information access and display, becoming the preferred method for accessing

corporate data over the network. Web technologies can serve as an excellent infrastructure for simple and powerful tools to address the current problems of network management systems. Web-based tools can provide portability across platforms and a good framework for network management application architecture. Managing the WAN can significantly benefit from the use of web-based technology, such as easy-to-reach information, operation reuse, and consistency in presenting and accessing information and objects.

#### **M. TRAINING PROGRAM**

The site network administrators require training in network administration particularly in troubleshooting problem area. A clear path for troubleshooting and points-of-contact needs to exist and be understood by local administrators. The majority of network errors encountered throughout the implementation phase have been unrelated to WAN connectivity. This would reduce the burden of the WAN administrators.

Training program should be conducted in order to ensure the network always running well because its managing by the right personnel that has been trained properly. Network management needs the implementation of the process of using hardware and software by trained personnel to monitor the status of network components. They also monitor line facilities, question end users and carrier personnel, and recommend actions to alleviate outages and improve communications performance as well as conduct administrative tasks associated with the operation of the network. The training program for network administrators designed such a thing so that they knows the system's features and the functions and has knowledge about how to use and maintain the network management system.

Beside network administrators, the network operators also should be trained. Network operators responsible for operating the network in each LAN. They report the condition, status and operation of the network regularly to a network administrator. The trained network operators would recognize that WAN connectivity is exists or not.

People who will be trained should be the potential personnel that is required to support their unit organization and has a background in computer skills. The training program will take place in the computer training facility in the Eastern Fleet Training Command in Surabaya. Personnel that would be trained should be the military personnel from information technology units and also from command, control and communication units of each main naval base.

For network administrators, their ranks should be First Class Petty Officer until Ensign (E-6 until O-1). Windows 2000 MCSE certification exam should be used as a quality measurement for a network administrator and the training program should be executed based upon its syllabi. After completed the training these personnel are qualified as the network administrator which has a responsibility to maintain a set of procedures, software, and operations in order to keep a network operating near maximum efficiency. The success of any information system in each LAN depends on the skills of network administrators.

The ranks for network operators would be Third Class Petty Officer and Second Class Petty Officer (E4 and E5). The trained Second Class Petty Officer would responsible for operating HP OpenView tools. Their place of work would be in the Indonesian Eastern Fleet Network Operation Center in Surabaya. Third Class Petty

Officer would responsible for all network devices and they would be placed in each main naval bases LAN.

The qualification process is based on their experience and ability in computer communication systems. The selection process for network administrators and network operators personnel could bring an improvement to Navy's return of investment. This training program is a career cycle for all personnel that had been trained, not just once. The well trained personnel would have value added that support his job and promotion. Network management required complex and continuously program including training to provide the optimal solution in improving the Indonesian Eastern Fleet information technology systems.

## **VI. PROPOSED WAN DESIGN USING EXTEND-4 SIMULATION SOFTWARE PROGRAM**

This chapter explores the use of modeling and simulation as a tool in designing and evaluating the Indonesian Eastern Fleet network system. The author has developed a wide area network (WAN) design model using an object oriented modeling and simulation tool called EXTEND-4 made by Imagine That, Incorporated. EXTEND-4 is used to measure specific performance variables in a quantitative fashion. It is an easy to use graphical simulation tool that allows a user to model complex discrete or continuous systems while varying performance parameters. EXTEND-4 makes it easy for the user to recognize and configure Graphical User Interface (GUI) icons with predefined properties that are adaptable to represent steps and links in a process.

### **A. ESTIMATING NETWORK TRAFFIC DATA REQUIREMENTS**

The network traffic data requirements were used as a source to compute the flow of network messages all over the WAN for modeling and simulation. Each LAN in this network design uses Fast Ethernet 100BaseT LANs architecture that shares a network media 100 Mbps CAT-5 UTP cable. All LANs are linked by ISDN 128 Kbps WAN service and connected by the Cisco 1003 ISDN router. As the second alternative we use T1 line 1.5 Mbps to offer the best solution for network performance.

The messages are delayed in the Ethernet LAN by 100 Mbps CAT-5 UTP bandwidth, and in the wide area network by the WAN connection bandwidth. Currently the Indonesian Eastern Fleet network exhibits worst case delays of approximately 10 minutes. There is no set requirement on e-mail traffic; delivery within a few minutes is

desirable although a few hour delays are usually acceptable. Video is presently sent only within the headquarters LAN and delays are consistent with medium quality video. Data transfer delays are currently approximately 3 to 5 minutes going from one Indonesian Eastern Fleet LAN to another Indonesian Eastern Fleet LAN. Any new network must meet, or preferably reduce, these data latencies.

Network traffic involves email traffic volume, video conferencing network traffic, and data transfer traffic volume which are counted per one workday which is equal to 12 hours. The result of this sum in Mega bits is multiplied by 8, to convert to Mega bytes per day, and then divided by (12hours x 60 minutes x 60 seconds) to provide the result of message sizes in bytes per second that would be sent to destinations all over the WAN.

In this network model 45 computers are represented as one node. Thus, for example, the Surabaya main Naval base LAN that consists of 225 computers has a total of 225 nodes:  $45 = 5$  nodes. Network traffic for one node is the aggregated traffic of 45 computers. This simplification was done in order to keep the network model reasonably sized. There are total 24 origin nodes and 24 destinations in our WAN design. The detail lists are shown at the estimated network traffic data of the Indonesian Eastern Fleet WAN design as follows:

**1. Surabaya Metropolitan Area Network (MAN)**

**a. Surabaya Main Naval Base LAN**

- Ethernet LAN transmission data rate = 100 Mbps
- WAN Bandwidth using ISDN = 128 Kbps, using T1 line = 1.5 Mbps
- Total computers = 225
- Total nodes = 225:  $45 = 5$
- Email traffic volume = 26 Mbits per day
- Video conferencing network traffic = 2340 Mbits per 30 minutes per day

- Data transfer (text, image, graphic) traffic volume = 68 Mbits per day
- Average total traffic rate = 7040 bytes per sec

***b. The Indonesian Eastern Fleet Headquarters LAN***

- Ethernet LAN transmission data rate = 100 Mbps
- WAN Bandwidth using ISDN = 128 Kbps, using T1 line = 1.5 Mbps
- Total computers = 315
- Total nodes =  $315:45 = 7$
- Email traffic volume = 40 Mbits per day
- Video conferencing network traffic = 2730 Mbits per 35 mnts per day
- Data transfer (text, image, graphic) network traffic = 96 Mbits per day.
- Average total traffic rate = 8290 bytes per sec

***c. Juanda Naval Air Base LAN***

- Ethernet LAN transmission data rate = 100 Mbps
- WAN Bandwidth using ISDN = 128 Kbps, using T1 line = 1.5 Mbps
- Total computers = 90
- Total nodes =  $90:45 = 2$
- Email user traffic volume = 10 Mbits per day.
- Video conferencing network traffic = 1170 Mbits per 15 mnts per day
- Data transfer network traffic (text, image, graphic) = 24 Mbits per day
- Average total traffic rate = 3480 bytes per sec

**2. Ujung Pandang Main Naval Base LAN**

- Ethernet LAN transmission data rate = 100 Mbps
- WAN Bandwidth using ISDN = 128 Kbps, using T1 line = 1.5 Mbps
- Total computers = 180
- Total nodes =  $180:45 = 4$
- Email user traffic volume = 20 Mbits per day
- Video conferencing network traffic = 1950 Mbits per 25 mnts per day
- Data transfer network traffic (text, image, graphic) = 50 Mbits per day
- Average total traffic rate = 5840 bytes per sec

**3. Bitung Main Naval Base LAN**

- Ethernet LAN transmission data rate = 100 Mbps



- WAN Bandwidth using ISDN = 128 Kbps, using T1 line = 1.5 Mbps
- Total computers = 135
- Total nodes = 135: 45 = 3
- Email user traffic volume = 15 Mbits per day.
- Video conferencing network traffic = 1560 Mbits per 20 mnts per day
- Data transfer network traffic (text, image, graphic) = 36 Mbits per day
- Average total traffic rate = 4660 bytes per sec

#### **4. Jayapura Main Naval Base LAN**

- Ethernet LAN transmission data rate = 100 Mbps
- WAN Bandwidth using ISDN = 128 Kbps, using T1 line = 1.5 Mbps
- Total computers = 135
- Total nodes = 135: 45 = 3
- Email user traffic volume = 15 Mbits per day.
- Video conferencing network traffic = 1560 Mbits per 20 mnts per day
- Data transfer network traffic (text, image, graphic) = 36 Mbits
- Average total traffic rate = 4660 bytes per sec

### **B. NETWORK MODELING AND SIMULATION**

We use the blocks from the EXTEND-4 standardized libraries of process objects. These blocks are designed to facilitate the rapid development of simulation models of queuing systems by dragging and dropping them from the library to the model workspace. The three most-used libraries that come with the basic EXTEND-4 package are Generic, Discrete Event, and Plotter Libraries [Diamond, 1997]. The Generic Library is used for continuous modeling and the Discrete Event library is used for discrete event modeling. The Plotter library holds all the common types of plotters used in our models. Some of these plotters are specific to continuous or discrete event models, while others can be used with either. Models can be built to simulate discrete events or continuous flow problems. The different libraries that are built into the application are generally

application are generally designed specifically for one or the other. However, many objects within the libraries are interchangeable with either type of model

EXTEND-4 uses two main types of blocks in its simulation program: item blocks and attribute blocks. Item blocks receive and process discrete events or items that pass through them. Attribute blocks receive and process attribute values associated with items, although the items do not specifically transit through these blocks. The flow of the model is determined by the order of the connections between blocks of the model.

The actual moving of items between blocks is done through a messaging communication structure using item connectors and connections. This messaging system allows modelers to place blocks in a more intuitive sequence. Discrete event blocks send messages to each other during the course of a simulation run. These messages are used for communication regarding whether items are available, whether they have been taken, and whether a block is free to receive items.

In this network design, the blocks are grouped together as a hierarchical block and represented as custom blocks in the model workspace. A hierarchical block is unique. It has some characteristics of a block and some characteristics of a model worksheet. Hierarchical blocks have two windows: the layout pane window, which can be seen by double-clicking on a hierarchical block, and the structure window. The structure window contains another view of the layout pane, and we build a new hierarchical block or make changes to an existing hierarchical block's icon, connector position, and so forth. When a hierarchical block is opened by double-clicking on it, the layout of the submodel can be seen in the hierarchical window.

The first step in building the network model is to develop the model of each local area network (LAN). EXTEND-4 provides the blocks necessary to construct the LAN model using communications component logic that was built based upon the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) Fast Ethernet LAN architecture using the CAT-5 UTP 100 Mbps cabling system. All LANs are linked up together as an integrated wide area network (WAN) using the ISDN 128 Kbps/T1 Line 1.5 Mbps. The model descriptions are intended to provide a basic working knowledge of the model.

### 1. Generating the Message

The messages for the network traffic come from the origin message hierarchical blocks in each LAN. Figure 10 shows the high level hierarchical block of messages originating at node 1, and Figure 11 shows detailed view or the layout of the submodel in the node 1 hierarchical window.

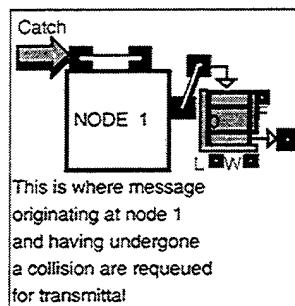


Figure 11. High Level View of the Origin Message Hierarchical Block

Node 1 represents the first 45 workstations at the Surabaya main Naval base LAN. The Surabaya main Naval base LAN has 225 computers that can be substituted to 5 nodes: Node 1, Node 2, Node 3, Node 4, and Node 5.

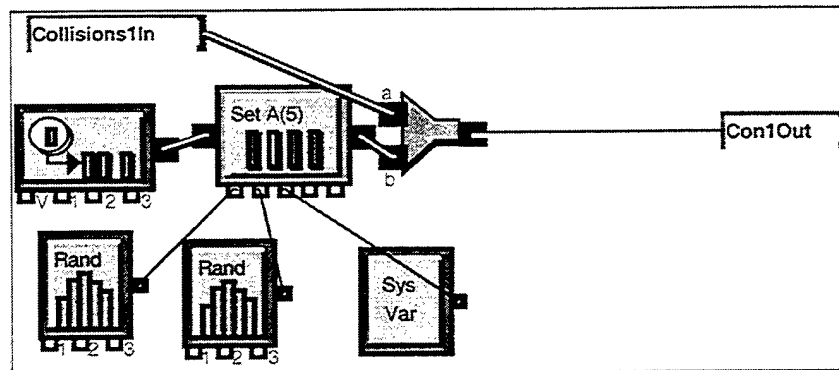


Figure 12. Detailed View of the Origin Message Hierarchical Blocks.

Each node generates messages that consist of e-mail, video conferencing, and data transfer with a certain amount of average message traffic rate already discussed in the previous section. The messages are generated by the “Generator” program block in these nodes with a certain message size that are defined by the Set Attribute program block. The generator provides items for a discrete event simulation at specified interarrival times. Each block has a dialog box that allows for customization of its performance parameters. The parameters for the distribution arrival times are set in the dialog box. At the first run of the Simulation, the exponential random distribution with frequency 1 second is used. For the second run of simulation, frequency 0.5 second is used. Figure 12 shows the generator program blocks and Figure 13 shows its dialog box.

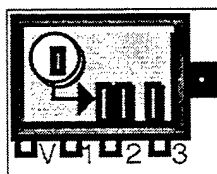


Figure 13. Generator Program Block.

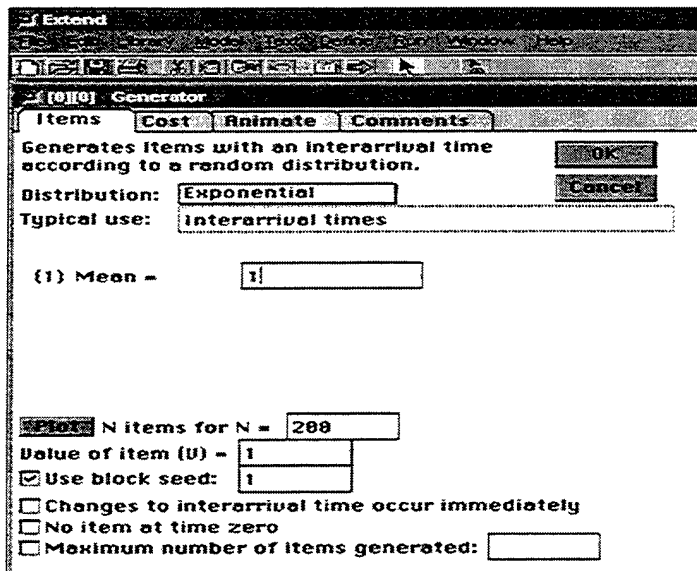


Figure 14. Generator Dialog Box

The “Set Attribute” block sets the specific attribute of items passing through the block. A “Get Attribute” block reads these attributes as the objects pass through the model, facilitating routing of the objects. Up to five attribute names and values may be assigned to an item with this block. The attributes may add to or replace existing item attributes. The amount of network traffic message size is specified with the value input connector at the dialog tab, and this is the message size that will be sent to all destinations over the network. Figure 14 shows the Set Attribute program block, and Figure 15 shows its dialog box.

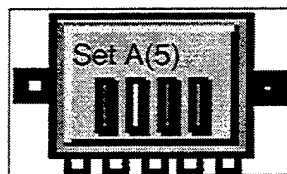


Figure 15. Set Attribute Block

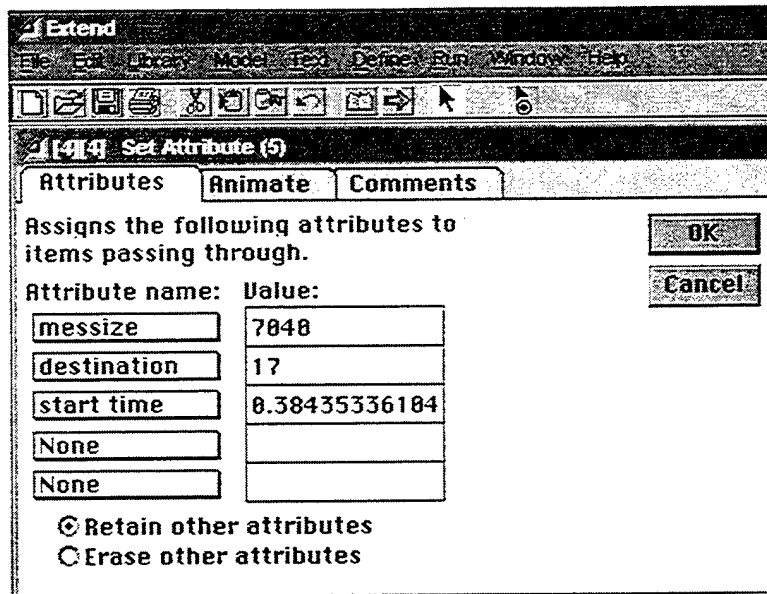


Figure 16. Set Attribute Dialog Box

The probabilities of the messages that will arrive at each destination is set by the input random number block. The input random number generates random integers or real numbers based on the selected distribution. The type of distribution can be selected from among Uniform, Beta, Binomial, Erlang, Exponential, Gamma, Geometric, HyperExponential, LogLogistic, LogNormal, Negative Binomial, Normal, Pearson type, Poisson, Triangular, Weibull, and Empirical. [Diamond, 1997]

In our network design the type of distribution used is the "Empirical table". All message's destinations are appointed by its origin nodes. As mentioned previously, there are a total of 24 origin nodes and 24 destinations in the Indonesian Eastern Fleet WAN design that consist of the Surabaya main Naval base LAN = 5 nodes, the Indonesian Eastern Fleet headquarters LAN = 7 nodes, the Juanda Naval Air base LAN = 2 nodes, the Ujung Pandang main Naval base LAN = 4 nodes, the Bitung main Naval base LAN = 3 nodes, and the Jayapura main Naval base LAN = 3 nodes. Each node sends the

messages to all 23 destinations (not including itself) with a probability =  $1 : (24 - 1) = 1 : 23 = 0.043478$ .

Figure 16 shows the Input Random Number program block, and Figure 17 shows its dialog tabs. The values of our message destinations are entered in the first column of the dialog tabs, and the probability (=0.043478) of that value is entered in the second column. The value column contains the various values that will be output. Probability describes the chance that value will occur. The probability only needs to have the proper values relative to each other, since Extend scales them automatically.



Figure 17. Input Random Number Block

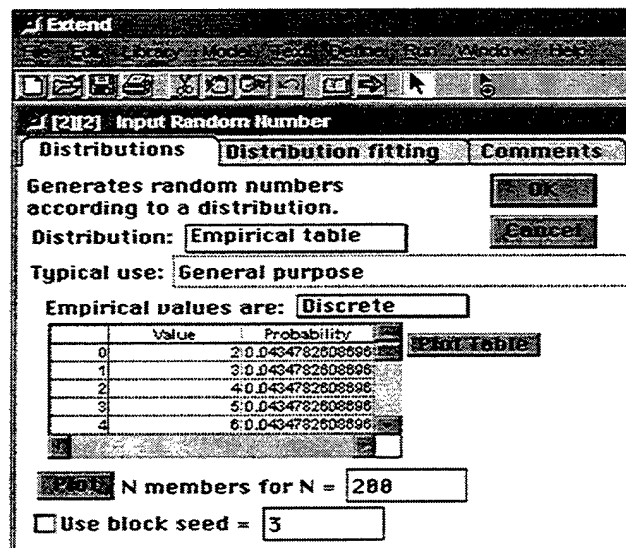


Figure 18. Input Random Number Dialog Box

## 2. Ethernet Bus

The messages are sent to the network via the Ethernet bus. Due to the 100 Mbps bandwidth (using Cat-5 UTP cable) the messages are delayed in the local area network

(LAN), represented by the activity delay program block. Each node senses the network and transmits only if the network is free.

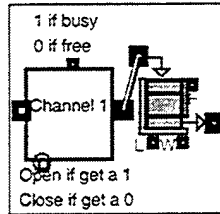


Figure 19. High Level View of the Ethernet Bus Hierarchical Block

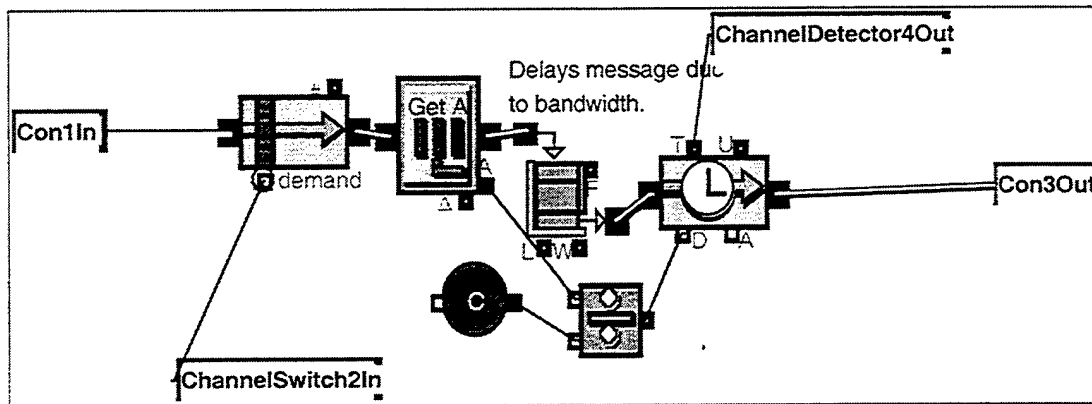


Figure 20. Detailed View of the Ethernet Bus Hierarchical Blocks

### 3. Initial Local Area Network Configuration

Message traffic generated from an origin node flows to the “first in first out” (FIFO) queue block (see figure 20), and then is sent to the Ethernet Bus in each channel where there is a sensor and detector to implement the channel access protocol of Carrier Sense Multiple Access with Collision Detection (CSMA/CD).

In the Ethernet bus (see figure 18 and 19) the messages pass through the activity service block. The “*Activity Service*” block acts as a gate. It passes an item only when the demand connector is connected and certain conditions exist at the demand input. This block serves as a conditional wait. It accumulates demand based on the values at the demand connector. When the demand input is 1 (greater than  $> 0.5$ ) or when an item is pulled in at demand, the item input connector allows the items through



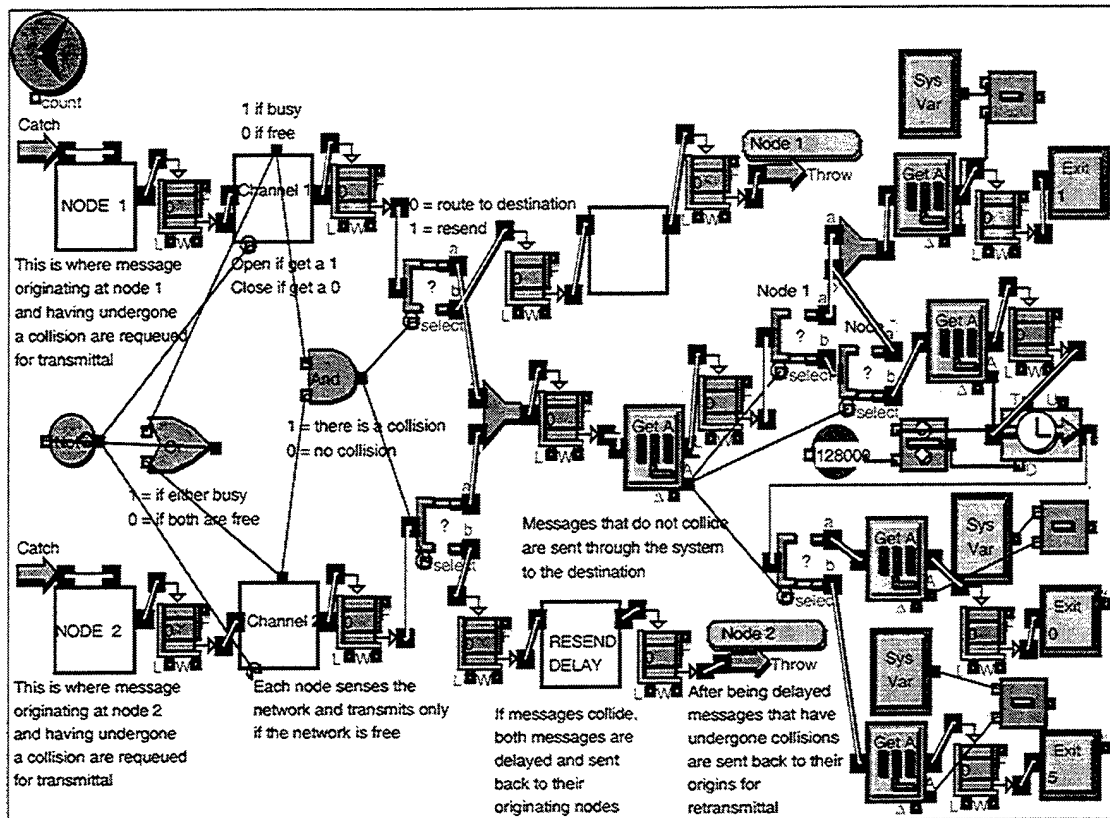


Figure 21. Initial Local Area Network Configuration

this block. If this is 0, the items will not be allowed through this block.

After passing through the activity service block, the message will come to the “Get Attribute” block. It displays attributes on items, then passes the items through. The attribute value is shown in the dialog and output at the A connector. As items are passed through the block, the block can either read or remove an attribute, and that attribute can be specified as the first attribute in the list or a named attribute. The name of the attribute to read should correspond to one of the names set in the Set Attribute block.

Whenever the Get Attribute reads the attribute “message size”, the items in the Ethernet Bus continue flowing via the FIFO queue to the Activity delay. In the Activity Delay the message is delayed due to the bandwidth 100Mbps. If no collisions occur,

messages are sent to the combine block and continue to flow to the destination in the wide area network via the Cisco 1003 ISDN router. The CSMA/CD protocol is invoked to control all the different types of message transmissions.

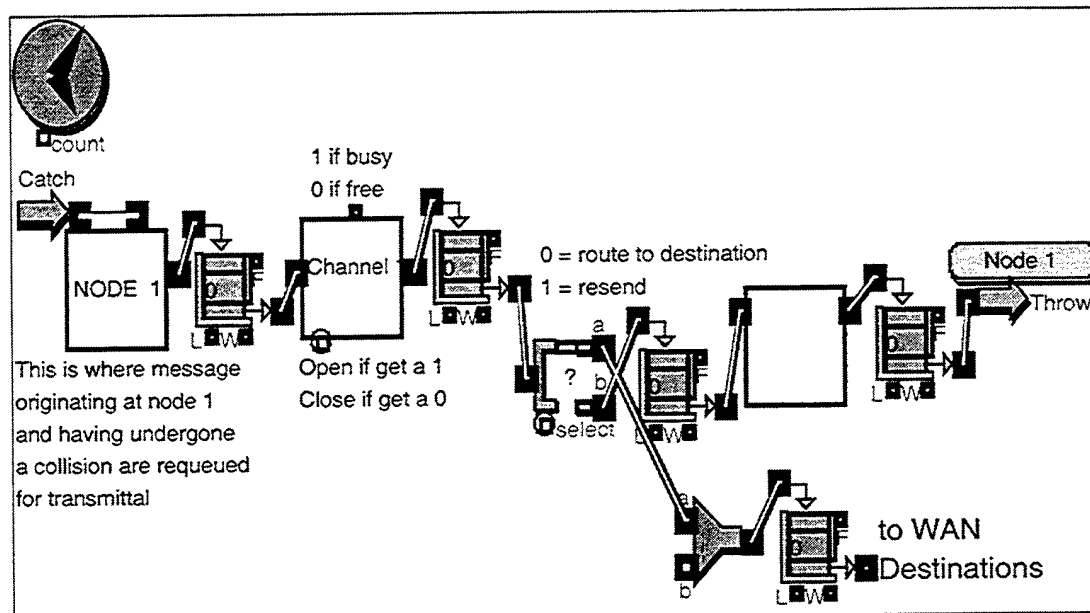


Figure 22. Flow of the Internal Messages within the Origin Node and the Ethernet Bus.

If there is a collision, messages are delayed and messages that have undergone collisions are sent back by the throw block to their origins for retransmittal. Figure 21 illustrates flow of the internal messages within the original node and the Ethernet bus in a local area network.

Internal messages must be sensed and detected. Both the sensor and detector work the bandwidth delay in the Ethernet Bus hierarchical block. If a message is being delayed, the sensor and detector will transmit the information.

The "Select Discrete Event Output" selects the input item to be output at one of two output connectors based on a decision. The item at the input is passed through the selected output. The dialog has options for changing the outputs after a given number of items have passed and selecting based on the select connector. The outputs are selected

based on the choices in the dialog. In this network design we define that if it is 0, messages will route to destinations in the network. If it is 1, a collision has occurred and the message has to be retransmitted.

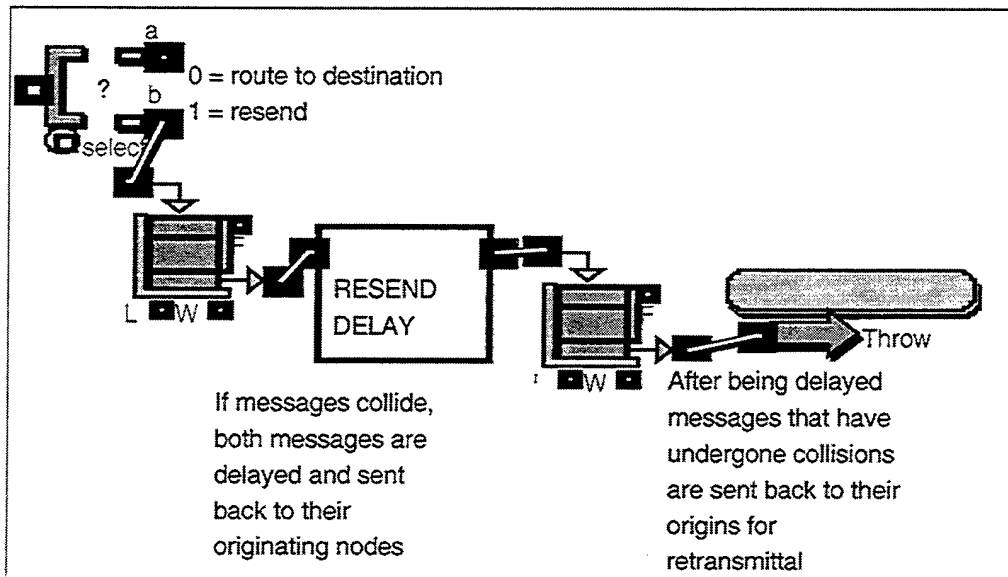


Figure 23. High Level Resend Delay Hierarchical Block

When messages collide, both messages are delayed and sent back to their originating nodes. A retransmitted message is resent to the identified catch block through the Resend Delay hierarchical block. Figure 31 shows the high level view of Resend Delay hierarchical block, and Figure 32 shows the detailed view of Resend Delay hierarchical block.

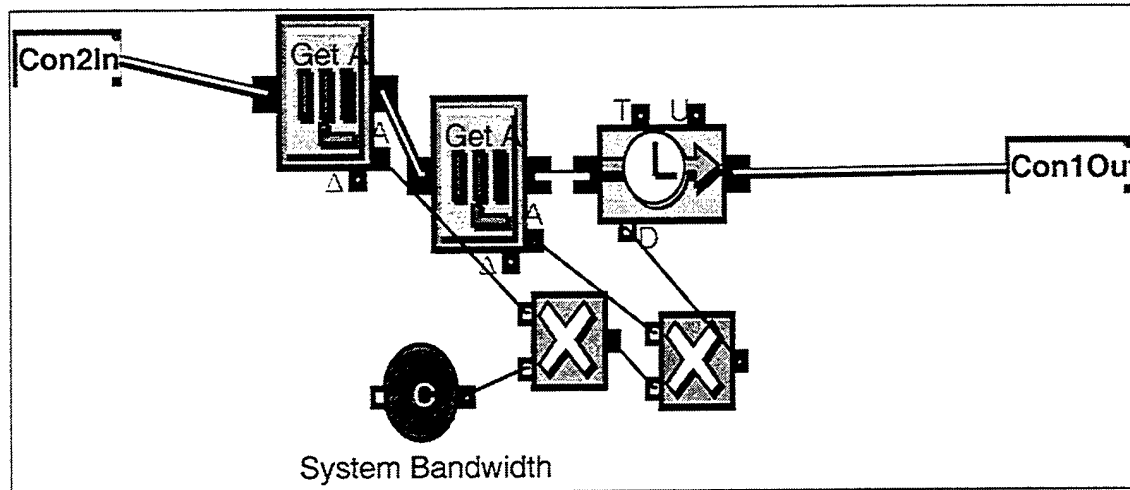


Figure 24. Detailed View of Resend Delay Hierarchical Block

#### 4. Interconnecting the Indonesian Eastern Fleet Wide Area Networks

Each LAN can be consists of two nodes, three nodes, four, and so forth. Once LANs are created, they can be interconnected to construct WAN communication architectures of virtually any size. Next Figures show the Extend-4 simulation model workspace of the Indonesian Eastern Fleet WAN design that consists of:

- Figure 25 shows high level view of the Indonesian Eastern Fleet WAN design
- Figure 26 shows detailed view of Surabaya main Naval base LAN
- Figure 27 shows detailed view of the Indonesian Eastern Fleet headquarters LAN
- Figure 28 shows detailed view of Juanda Naval air base LAN
- Figure 29 shows detailed view of Ujung Pandang main Naval base LAN
- Figure 30 shows detailed view of Bitung main Naval base LAN
- Figure 31 shows detailed view of Jayapura main Naval base LAN

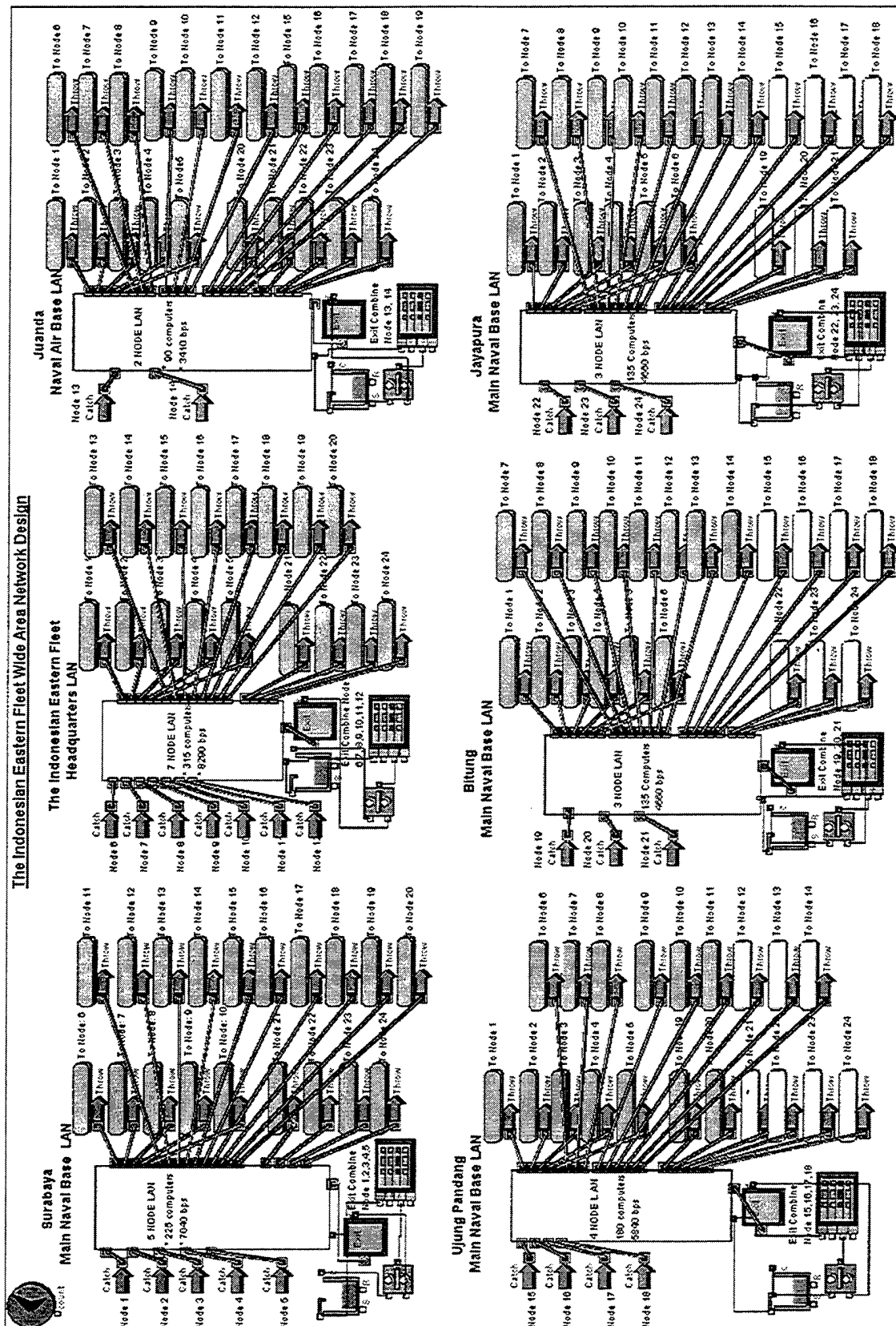
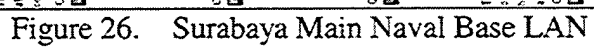


Figure 25. The Indonesian Eastern Fleet WAN design



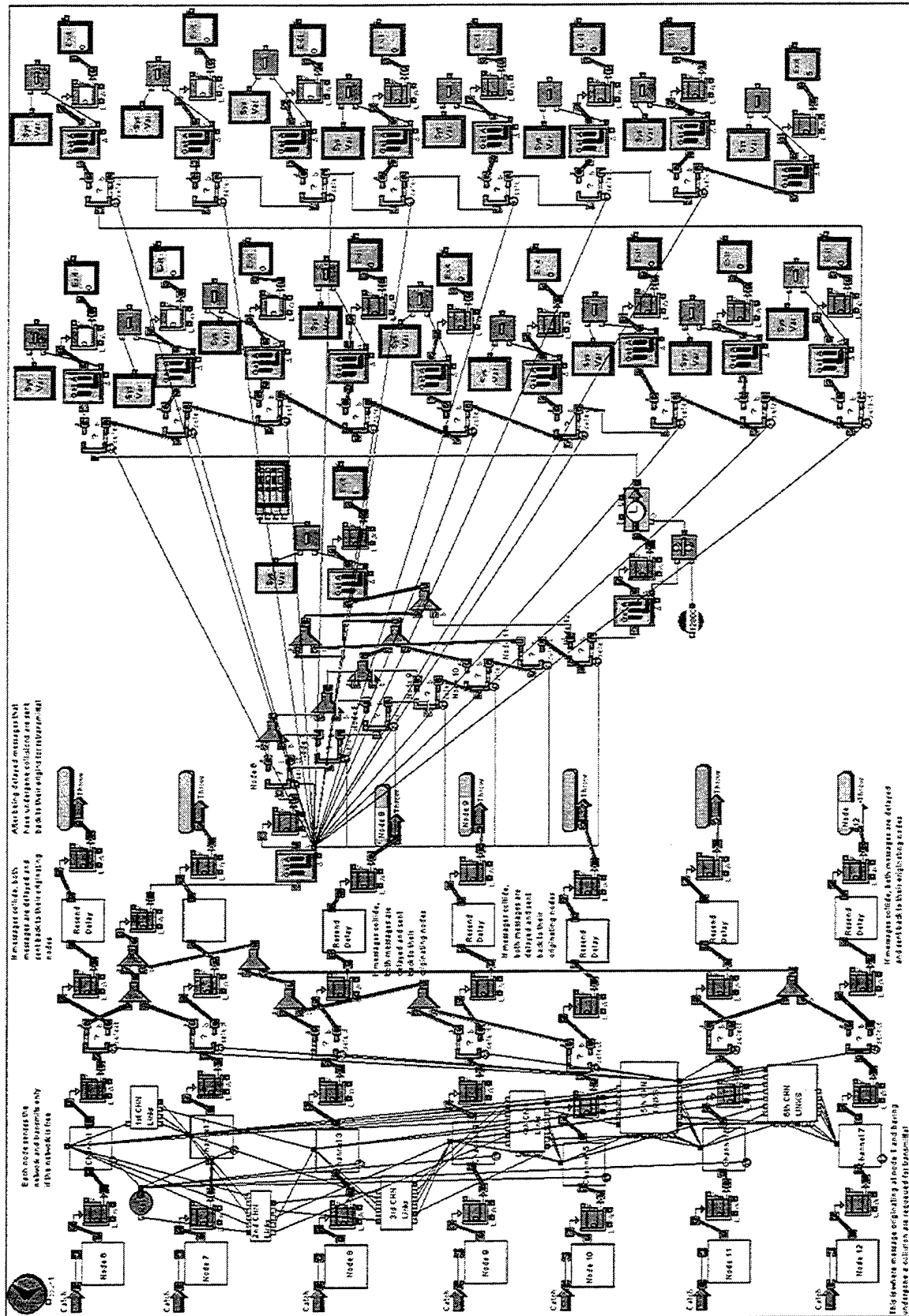


Figure 27. The Indonesian Eastern Fleet Headquarters LAN

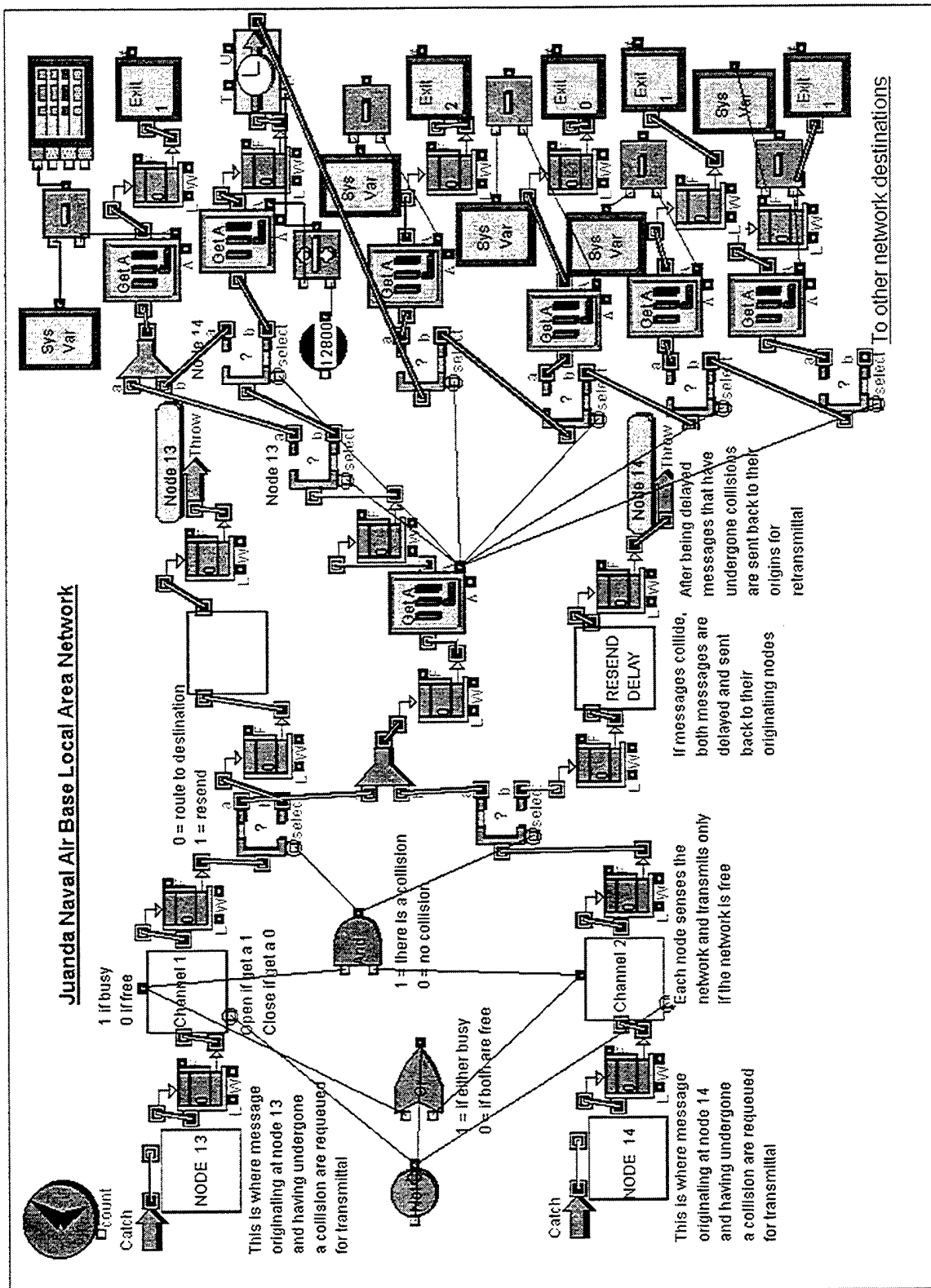


Figure 28. Juanda Naval Air Base LAN



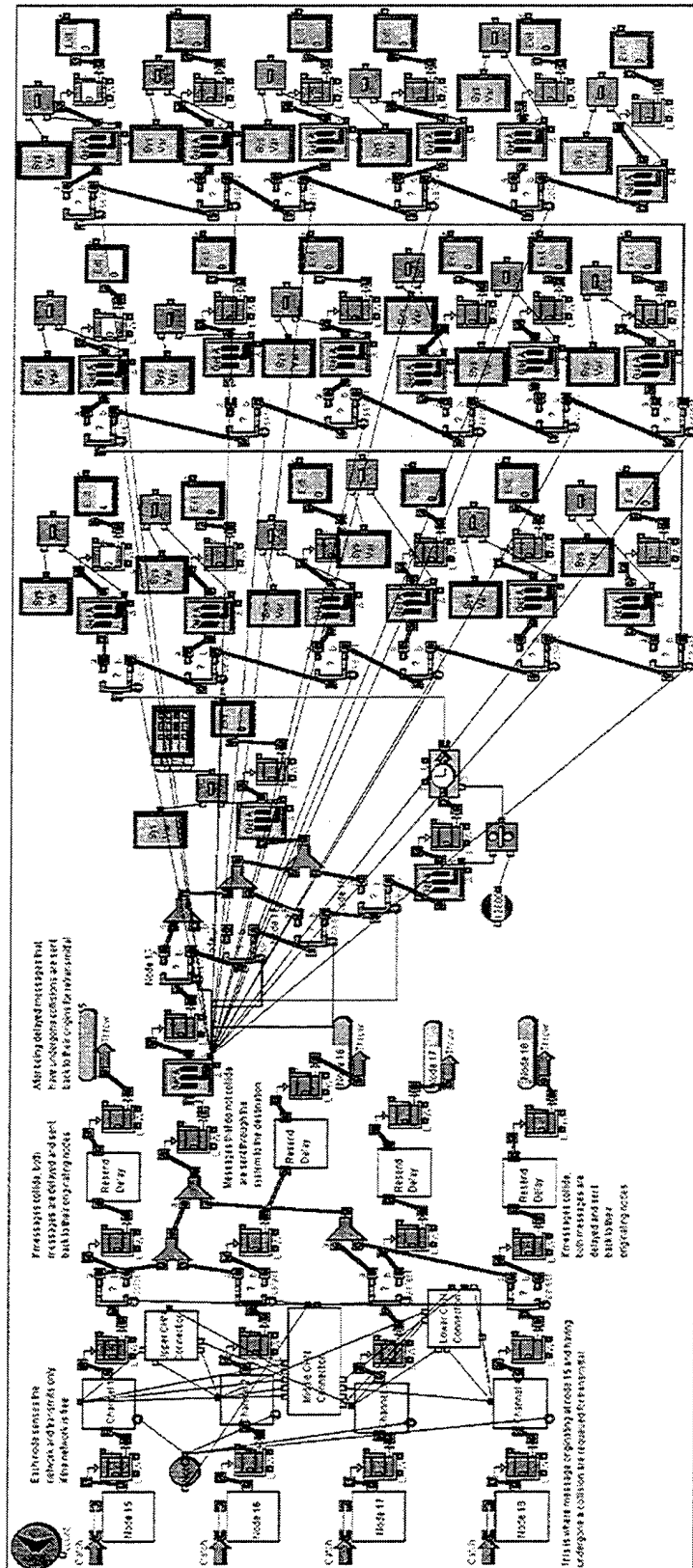


Figure 29. Ujung Pandang Main Naval Base LAN



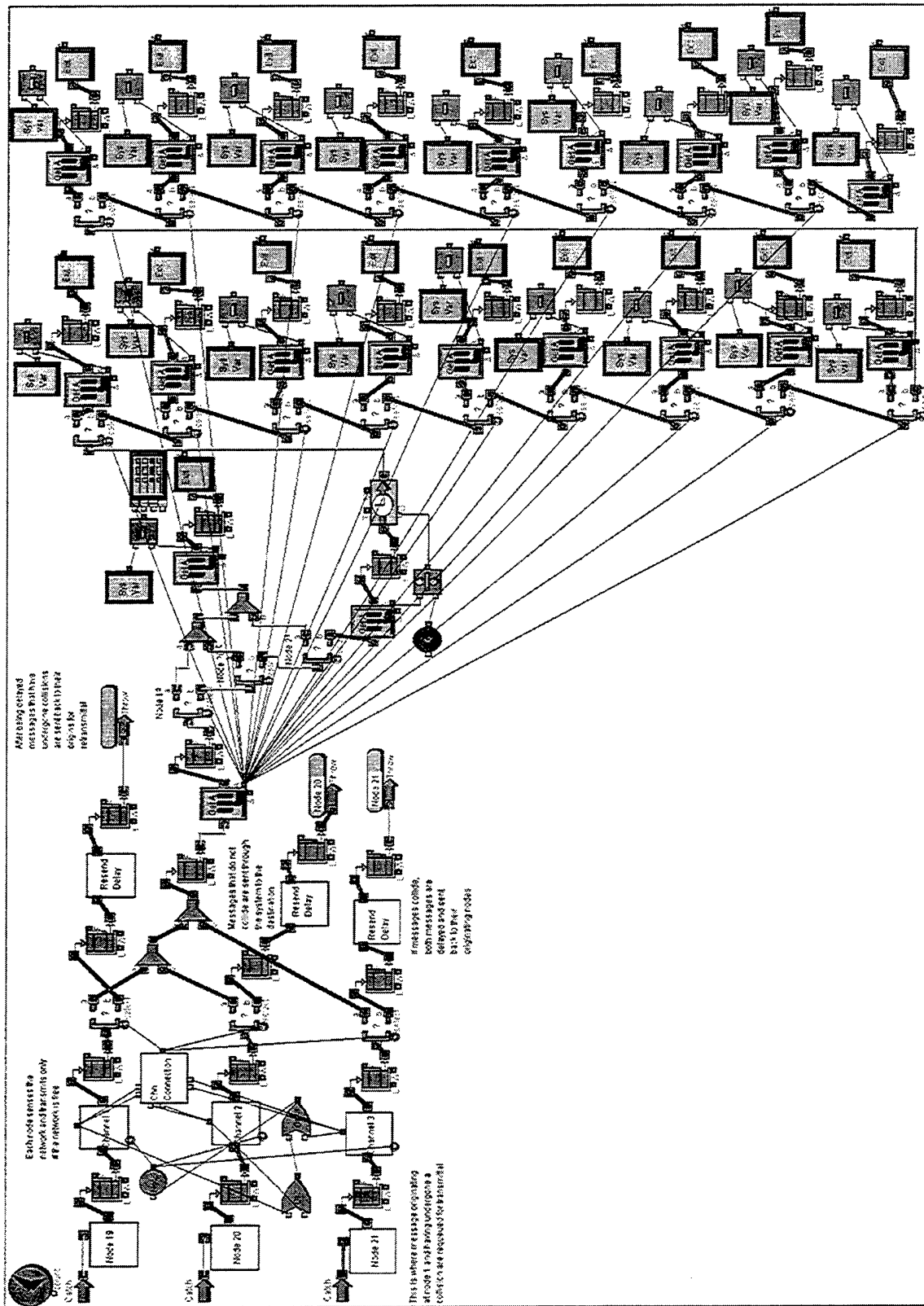


Figure 31. Jayapura Main Naval Base LAN

### C. TESTING AND SIMULATION RUN

This section provides results of testing and simulation runs of our wide area network design. A simulation was run using the initial network depicted in Figure 24. All simulations run for a specified time. Extend-4 determines the duration of a simulation based on the values entered in the Simulation Setup dialog (see Figure 31); the duration is the period from the start time to the end time.

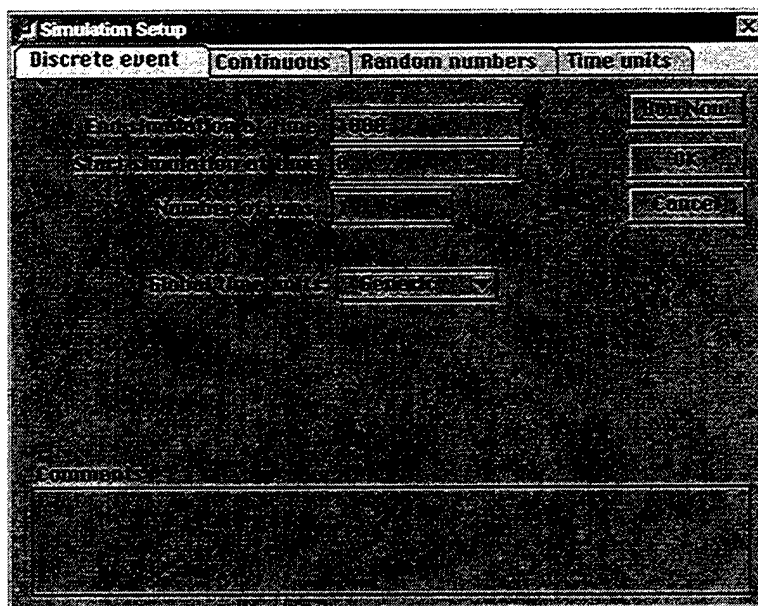


Figure 32. Simulation Set Up Dialog

A Run was executed for 100 seconds simulation time which constituted about 660 seconds real time, and 350 seconds simulation time which constituted about 2040 seconds real time. We executed two simulation runs in each simulation setup. The first run of simulation we used a frequency distribution of 1 second that we set in the Generator program block at each origin node. At the second run we use frequency distribution 0.5 second. All communications that started and ended within an origin nodes and the Ethernet bus showed a delay equal to the message size divided by the

bandwidth. The “Solid Blue” line indicates the bandwidth delay and the “Gray Pat Green” line indicates the average bandwidth delay. The charts depict the delay according to time for each LANs. The vertical axis depicts the delay incurred for each message. The horizontal axis displays the simulation time.

The charts on the figures 32 through figure 57 show some significant spikes in time delay during the messages flows in the network using WAN connection service ISDN 128Kbps and using T1 Line 1.544 Mbps.

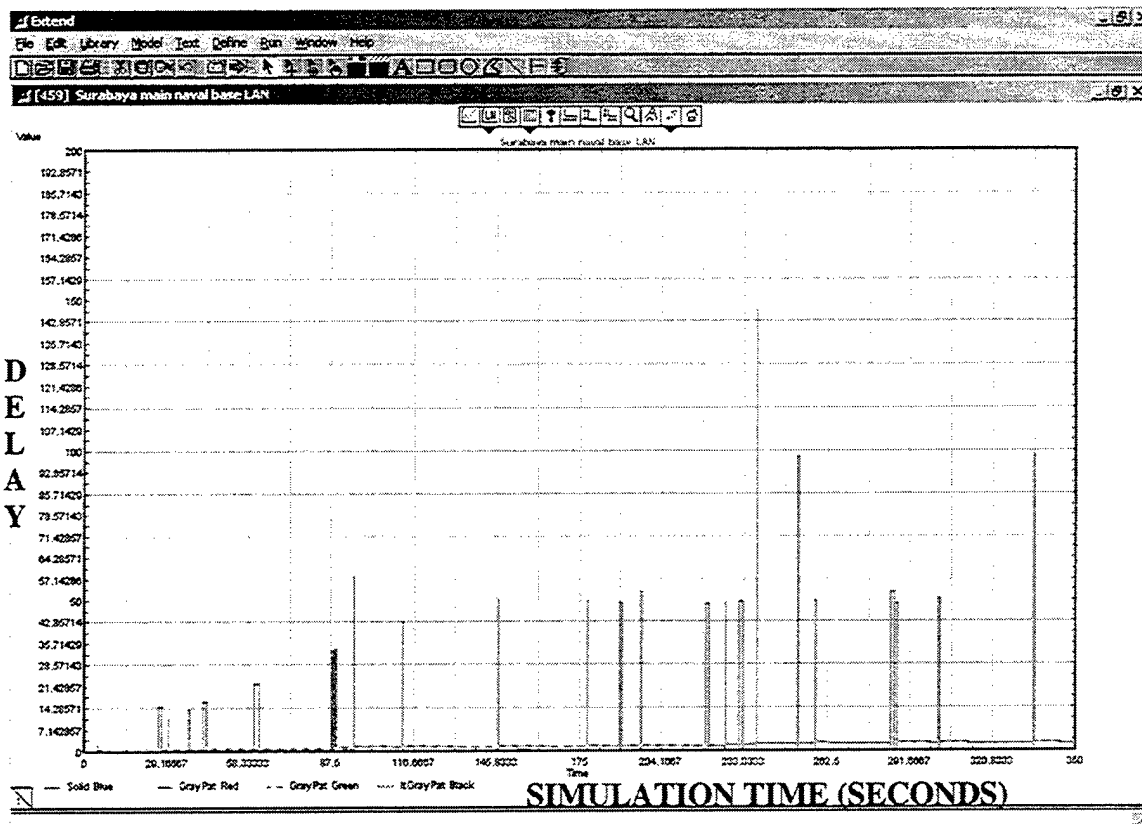


Figure 33. Delay Within Surabaya Main Naval Base LAN Using ISDN 128 Kbps

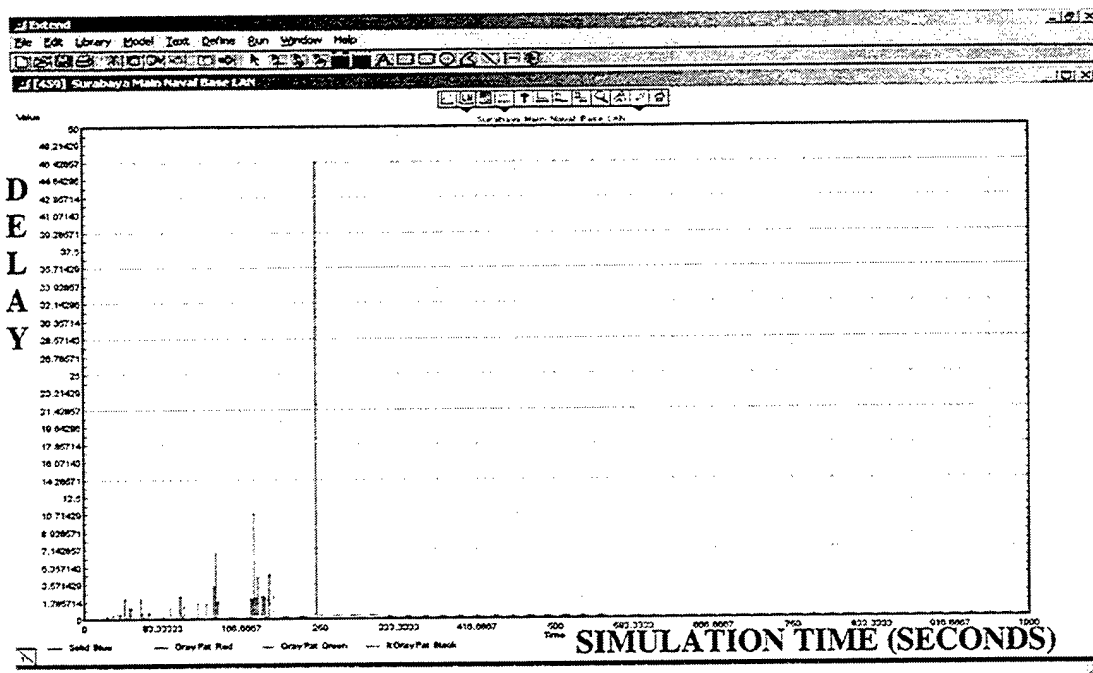


Figure 34. Delay Within Surabaya Main Naval Base LAN Using T1 Line 1.544 Mbps

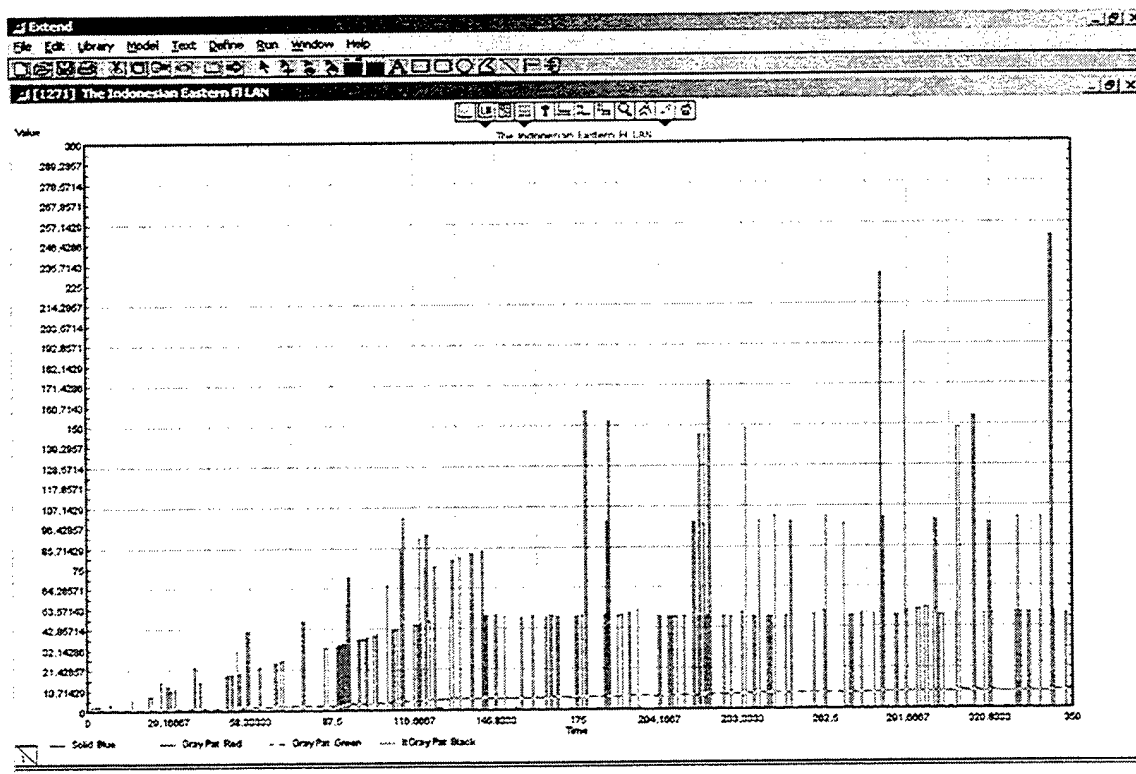


Figure 35. Delay Within the Indonesian Eastern Fleet Headquarters LAN Using ISDN 128 Kbps

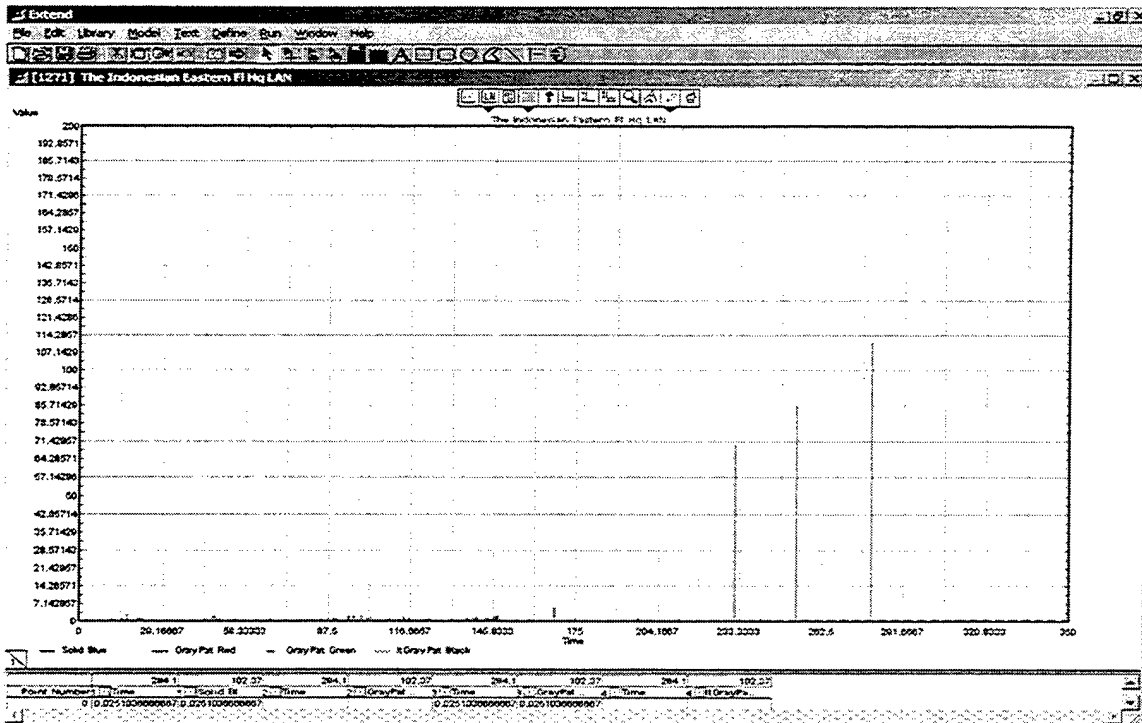


Figure 36. Delay Within the Indonesian Eastern Fleet Headquarters LAN Using T1 Line 1.544 Mbps

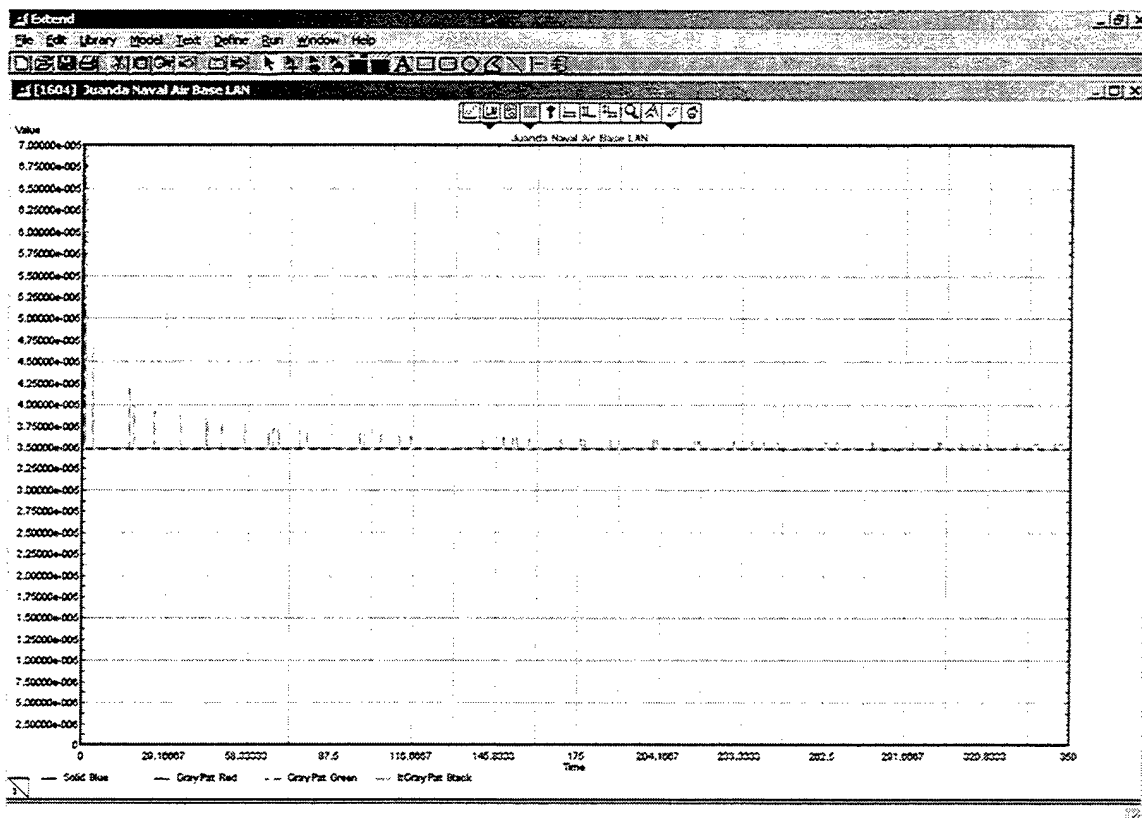


Figure 37. Delay Within Juanda Naval Air Base LAN Using ISDN 128 Kbps

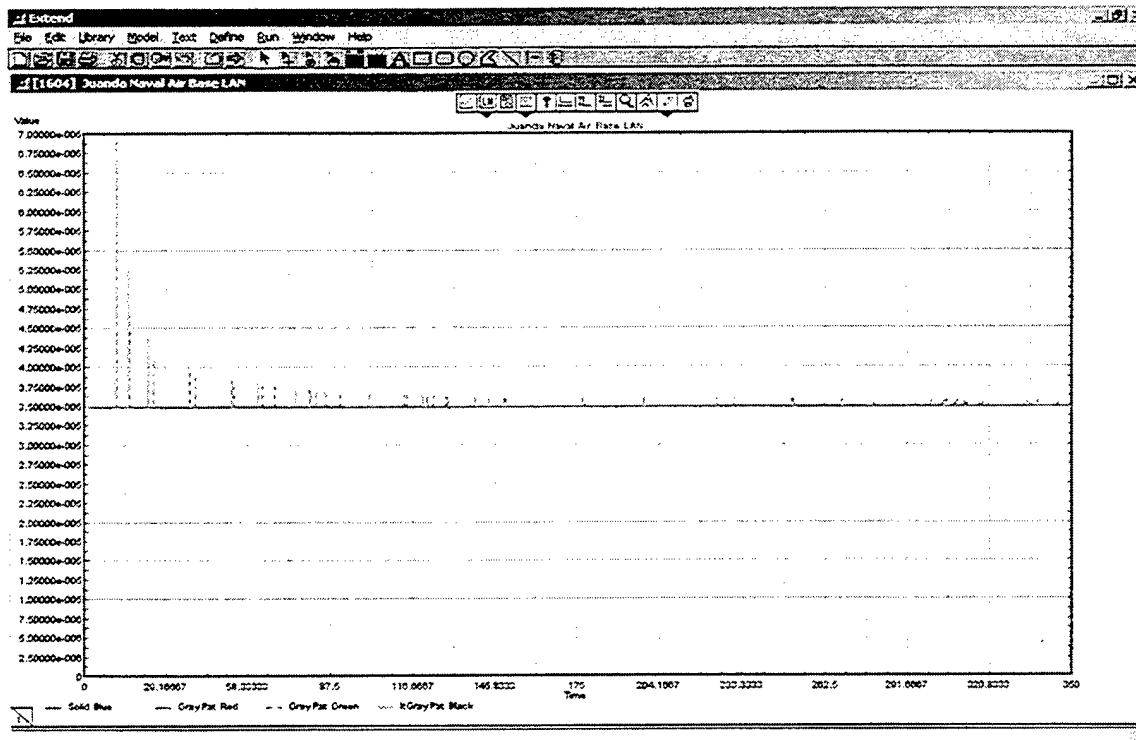


Figure 38. Delay Within Juanda Naval Air Base LAN Using T1 Line 1.544 Mbps

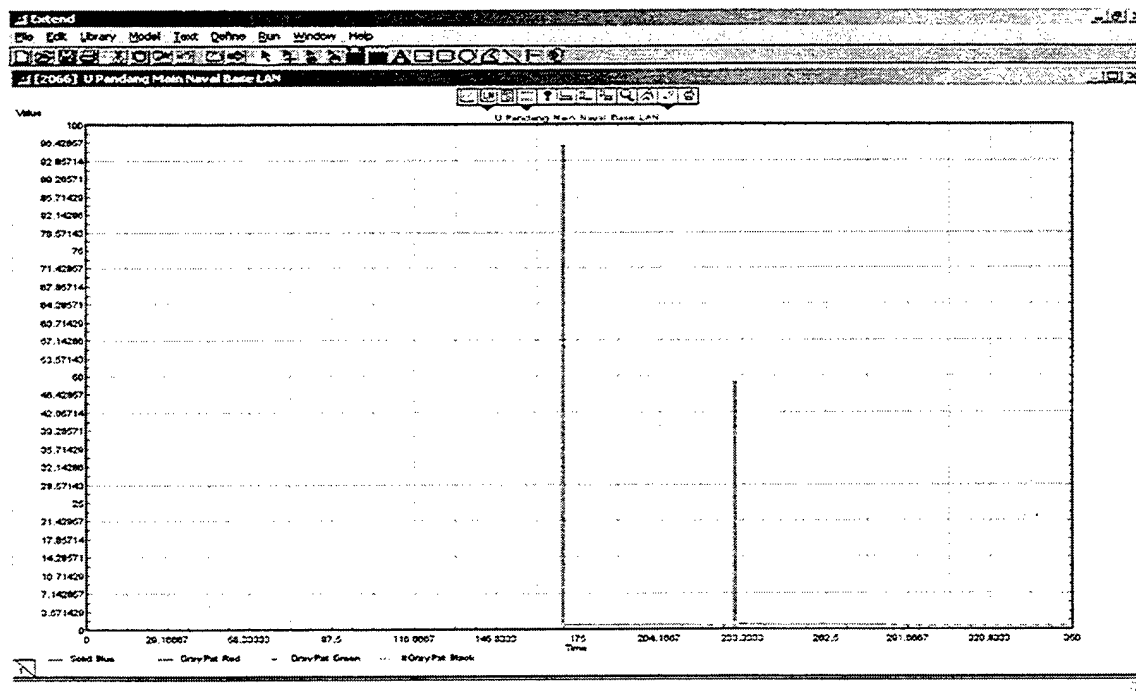


Figure 39. Delay Within Ujung Pandang Main Naval Base LAN Using ISDN 128 Kbps



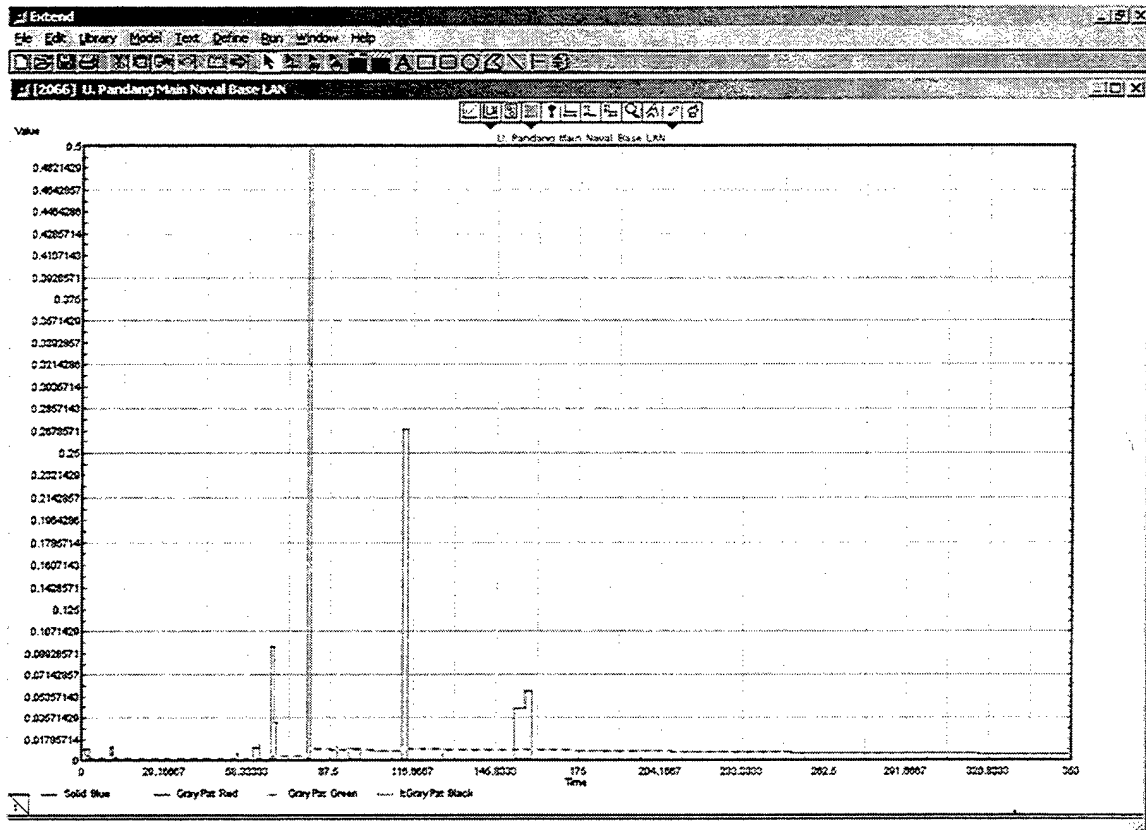


Figure 40. Delay Within U. Pandang Main Naval Base LAN Using T1 Line 1.5 Mbps

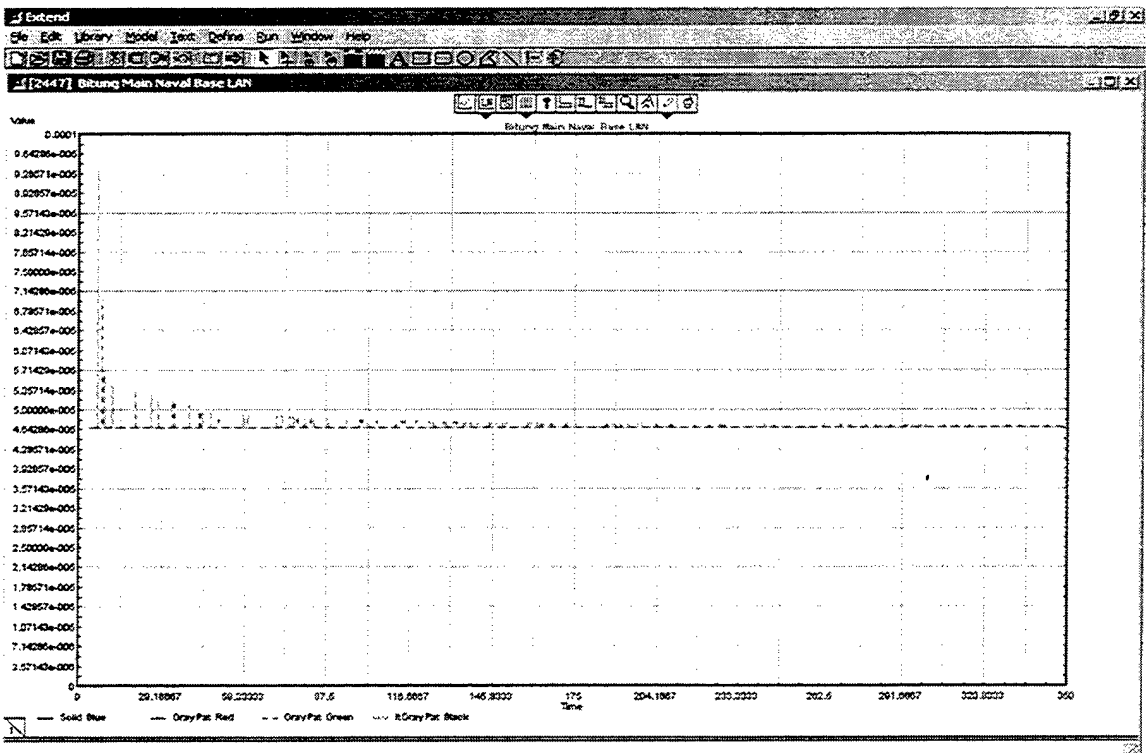


Figure 41 Delay Within Bitung Main Naval Base LAN Using ISDN 128 Kbps

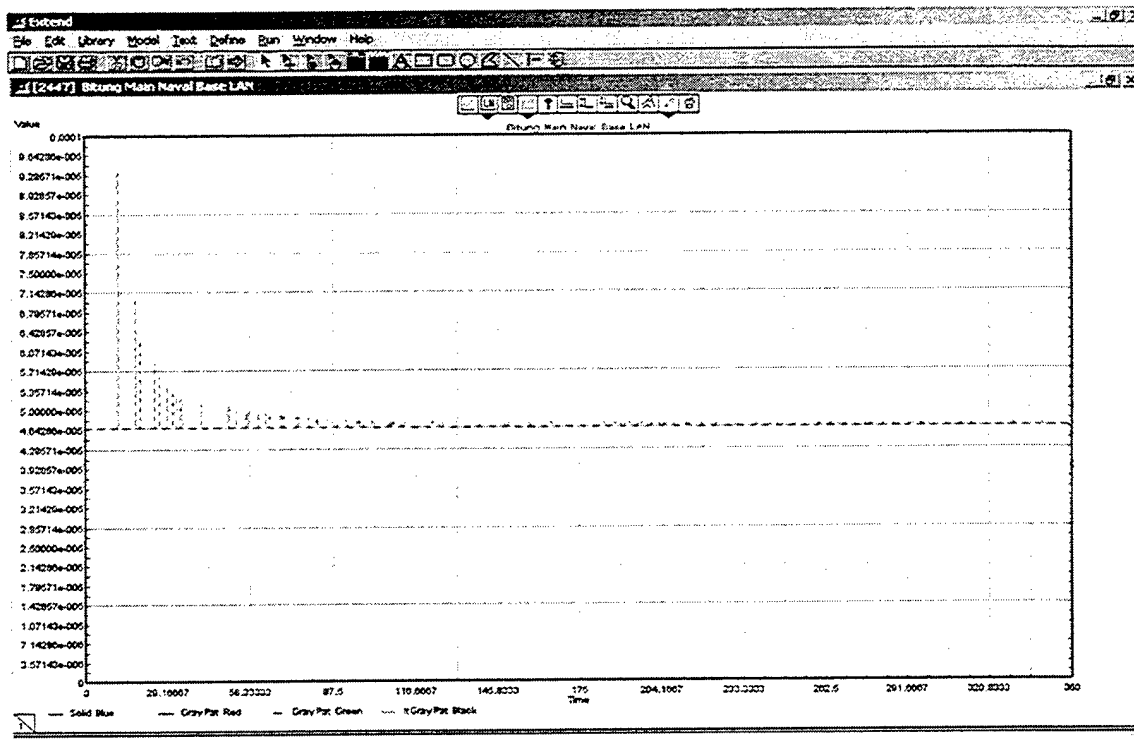


Figure 42. Delay Within Bitung Main Naval Base LAN Using T1 Line 1.544 Mbps

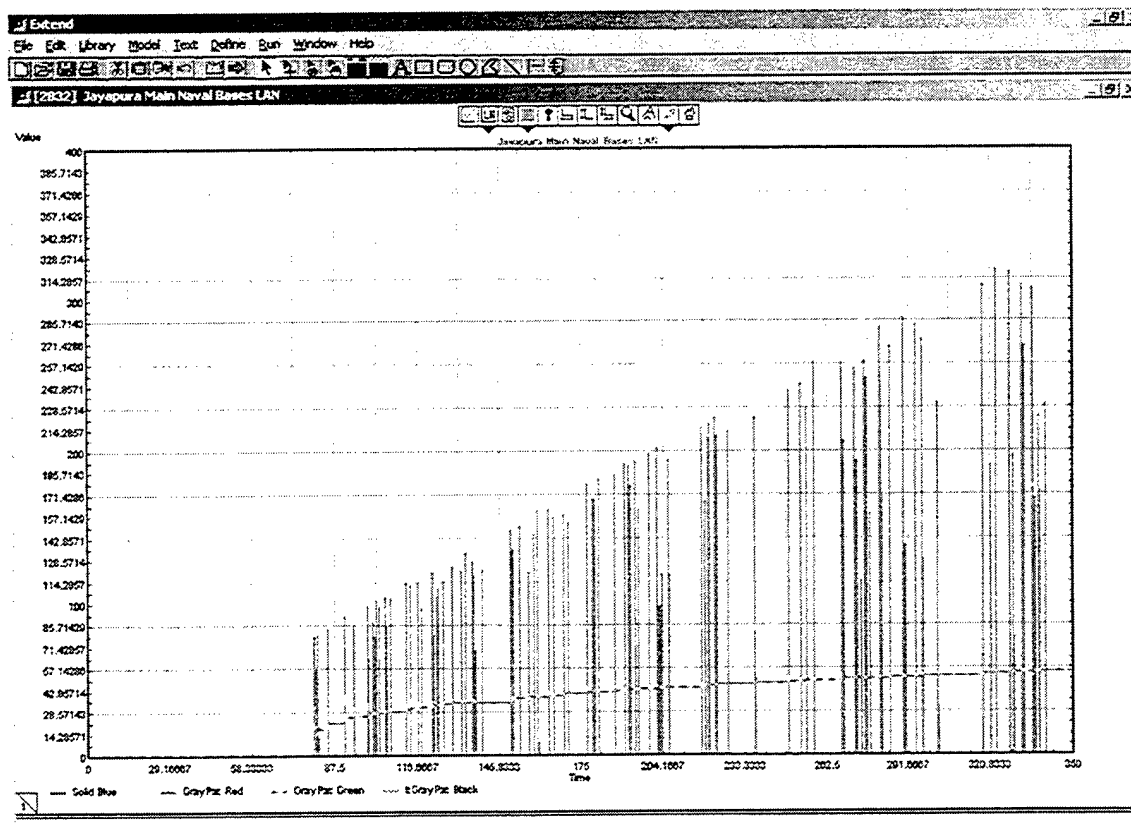


Figure 43. Delay Within Jayapura Main Naval Base LAN Using ISDN 128 Kbps

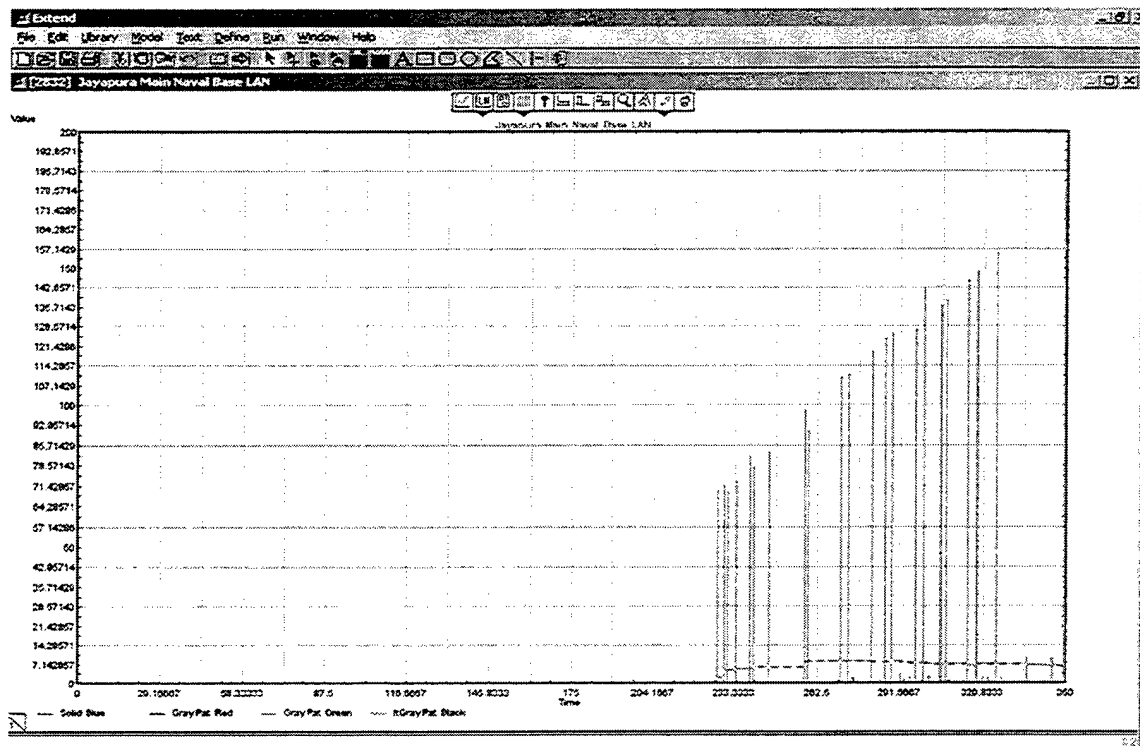


Figure 44. Delay Within Jayapura Main Naval Base LAN Using T1 Line 1.544 Mbps

A total of four simulation runs were conducted. The data is summarized in the plots and charts provided in Appendix A; the charts contain detailed message traffic reports for randomly selected nodes. Run 0 was programmed for duration of 350 simulation seconds using a frequency distribution of 1 second, which took 2040 seconds real time to accomplish. Run 1 was programmed for duration of 350 simulation seconds using frequency distribution 0.5 second, which took 2150 seconds real time to accomplish. Run 2 was programmed for a duration of 100 simulation hours using a frequency distribution of 1 second, which took 660 seconds real time to accomplish. Run 3 was programmed for a duration of 100 simulation seconds using a frequency distribution 0.5 second, which took 660 seconds real time to accomplish.

The final results of the simulation showed that the wide area network communication architecture which consists of six FAST ETHERNET 100 Mbps LAN

configuration had minimal delays that caused by messages collisions and the load of the network traffic. The worst case of maximum bandwidth delay (indicated by solid blue lines) along the wide area network traffic is 5 minutes. However, these maximum bandwidth delays still within requirement limitations for the flows of network traffic of the Indonesian Eastern Fleet WAN.

T1 Line 1.544 Mbps provides better results on the average bandwidth delay (indicated by the gray pat green lines). All charts showed T1Line's average bandwidth delay is smaller than ISDN's average bandwidth delay which mean the network traffic is working effectively without too much messages collisions and delays. It was occurred because the T1 line 1.544 Mbps provides 12 x faster speed and the network is working more efficiently. The result of the tests and simulation runs indicated that the Indonesian Eastern Fleet WAN design either using ISDN 128 Kbps or T1 Line 1.5 Mbps is reliable and has a good performance in its network traffic management.

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## VII. CONCLUSIONS AND RECOMMENDATIONS

An improvement in information systems will increase productivity, speed, and effectiveness of the Indonesian Eastern Fleet in accomplishing their tasks and missions. The Indonesian Eastern Fleet has to deal with many issues related to the fast improvement of the information technology systems. The existing information structure of the Indonesian Eastern Fleet must be optimized to handle fleet missions and tasks. The Indonesian Eastern Fleet network's communication system resources such as telephone, radio communications, microwave-link and satellite systems are still not linked for optimal data communication exchange to computer network systems in LANs or in an integrated WAN. Implementation of an integrated WAN using web-based technology is the best solution to utilize the existing computer communication systems in the Indonesian Eastern Fleet.

The linkage of all main naval base LANs using ISDN WAN connection service provides a reliable computer communication network that can be used by the Indonesian Eastern Fleet to support all naval units in the eastern region with great effectiveness. ISDN connection service is inexpensive compared to other WAN connection lines such as T1, T3, OC-3, OC-12, OC-48, or OC-192. However, it is already met the requirements of the Indonesian Eastern Fleet network. We can migrate easily to a T1 line 1.544 Mbps connection service in the near future if the budget allocation is available in order to achieve better network performance and speed. T1 Line 1.5 Mbps provides robust and reliable network configuration to support the main goal of the Indonesian Eastern Fleet information systems.

The Indonesian Eastern Fleet should use a standardized LANs architecture to provide a responsive and uniform network environment. We recommend Fast Ethernet 100 Mbps LANs configuration as a standardized LANs infrastructure for the Indonesian Eastern Fleet network. Fast Ethernet LANs configuration operating at 100 Mbps using CAT-5 UTP provides a reliable LAN technology that meets high demands for network bandwidth.

To obtain the best performance of our network, we need to determine the appropriate hardware and software compatibility that meets the Indonesian Eastern Fleet network's requirements and allocated budget. Inexpensive is the keyword in designing our network. However, effective local area networks (LANs) and an integrated wide area network (WAN) are required to achieve connectivity of the Indonesian Eastern Fleet Network. Web-based network management using HP OpenView should be implemented to monitor and control the operation of the network to ensure that they always run properly. SNMP was recommended to allow future growth toward remote WAN monitoring to assist fleet operations. Using the Web brings efficient communications and provides faster action in carrying out the tasks and missions.

There are great advantages and benefits in designing and evaluating the Indonesian Eastern Fleet WAN using EXTEND-4 software simulation program. Using EXTEND-4 we measure specific performance variables of our network design in a quantitative fashion. The result of simulation runs of network traffic that consists of email traffic volume, video conferencing network traffic, and data transfer traffic volume indicates that the WAN communication architecture that consists of six FAST ETHERNET 100 Mbps LAN had minimal delays caused by messages collisions and the

load of the network traffic. T1 line 1.544 Mbps connection service provides better results on the average bandwidth delay compared to ISDN 128 Kbps. T1 line has faster transmission than ISDN resulting in less messages collisions and network traffic working more fluently without too much bandwidth delay. The worst case of maximum bandwidth delays showed at the delay within Jayapura main Naval Base LAN using ISDN 128 Kbps (figure 42) along the network traffic is 5 minutes. This maximum bandwidth delay is still within requirement limitations of our WAN traffic flows.

From a total of four simulations run that we conducted, we concluded that the Indonesian Eastern Fleet WAN design either using ISDN 128 Kbps or T1 line 1.5 Mbps was reliable and had good performance in its network traffic management. In this simulation, an increase in delay can readily be seen at the last LAN, which is Jayapura LAN, which showed that the delay climbed sharply caused by the load of the network traffic. We recommend the users of the Indonesian Eastern Fleet WAN define their destination address by priority in order to avoid the network traffic jam and overloaded messages traffic at the busy working time.

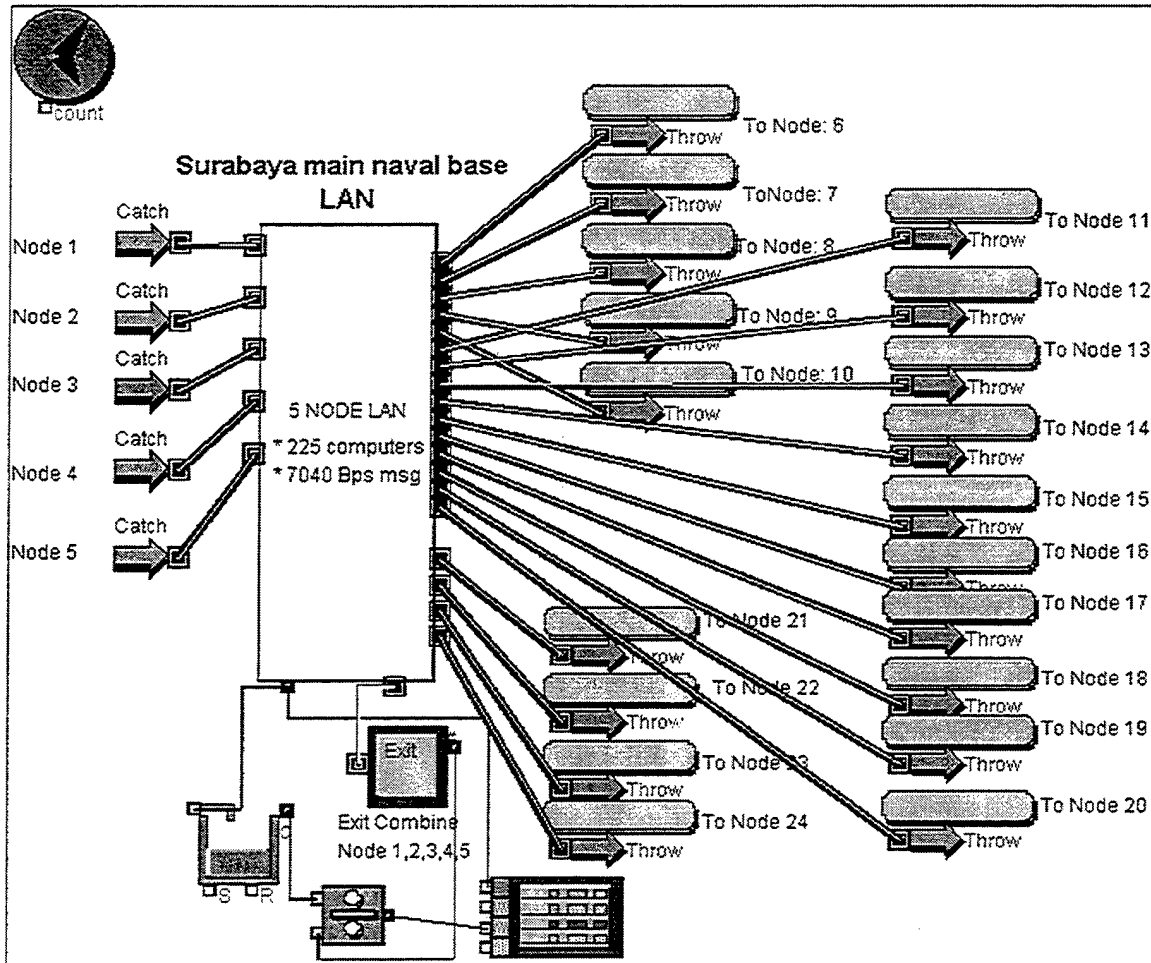
The basic configuration of the Indonesian Eastern Fleet wide area network has been built and tested in this thesis. The implementation of web-based network management will maintain and manage our network to run properly and to operate in optimal condition. An area of future research is designing and building mobile platforms networks for supporting operational fleet units including warships and aircraft. Life cycle costs that involve personnel and training need to be included in future research in order to obtain the main goal of an effective and efficient naval fleet. Strategic management needs to take a strong and active leadership role in developing all of the



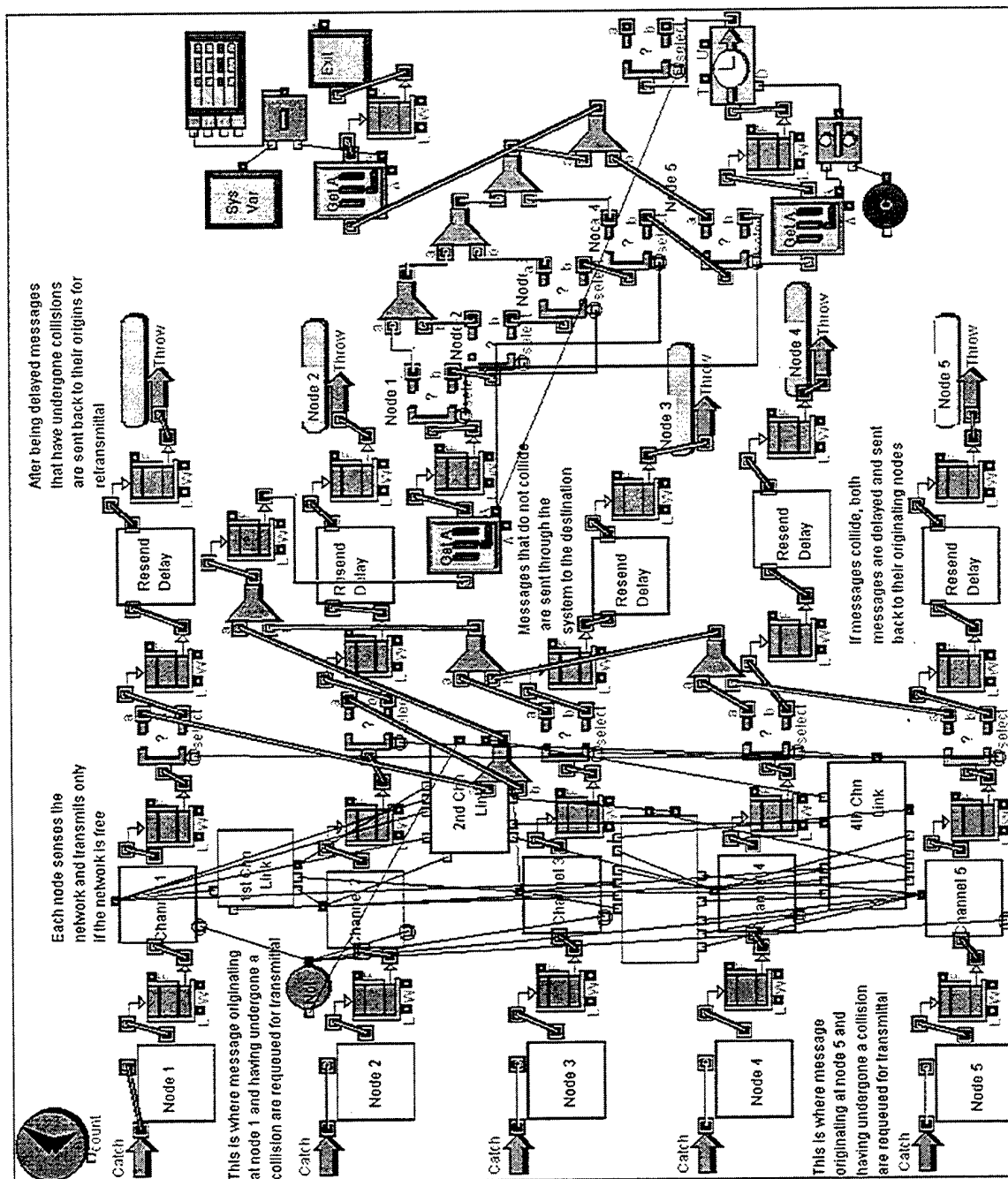
infrastructure to gain a benefit from information technology. The improvement of information technology occurs rapidly and we cannot avoid its influence to our systems. Information technology systems, especially computer communication networks, always improve and keep changing to give performance with time.

## **APPENDIX A. NETWORK DESIGN MODEL**

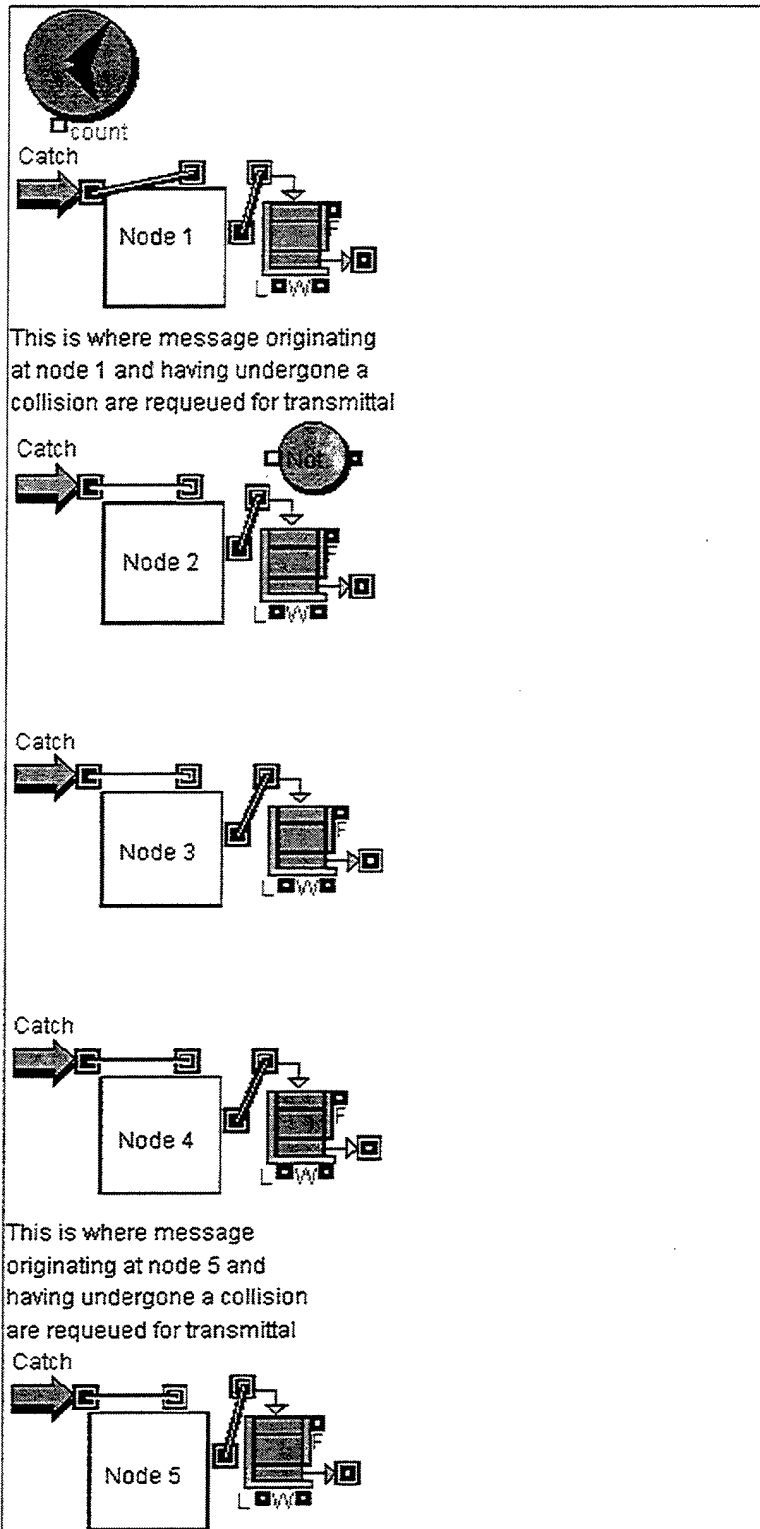
This appendix contains the high level view and detailed view of our local area network design model. The functionality within the model are shown by the low-level design model. Each block is displayed along with the detailed design of the block on the ensuing page. We displayed hierarchical blocks design to layer the model of all blocks. This appendix illustrates the configuration model of messages traffic flow in our Fast Ethernet local area network to all destinations in the wide area network.



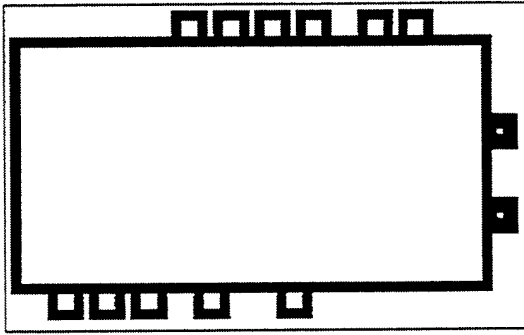
High Level View of LAN Configuration Model



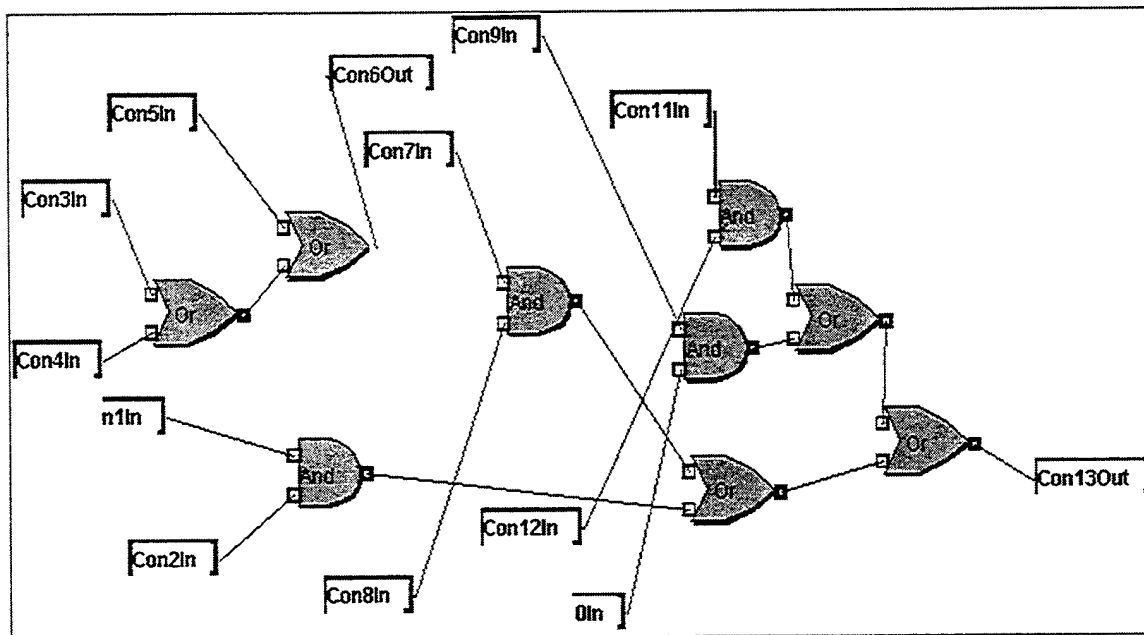
Fast Ethernet LAN Configuration Model



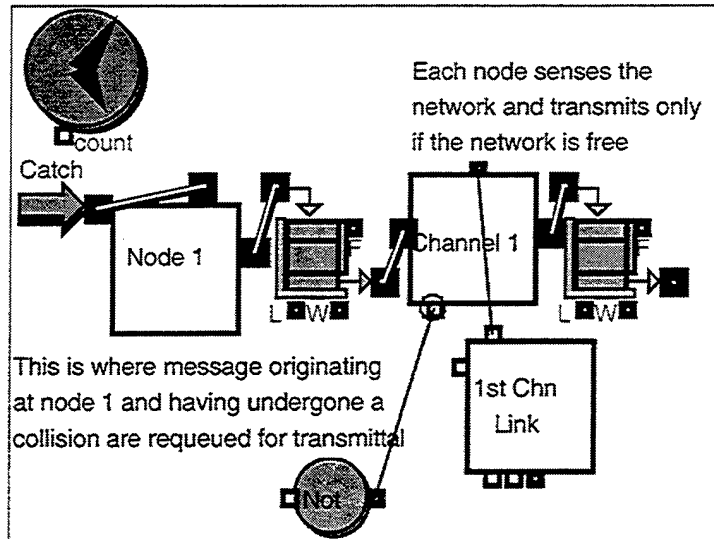
Network Origin Nodes



High Level View of LAN Channel Link Sensor



Detailed View of LAN Channel Link Sensor



Initial Messages Traffic Flow

Extend

File Edit Library Model Text Define Run Window Help

Queue, FIFO

Queue Results Animate Comments

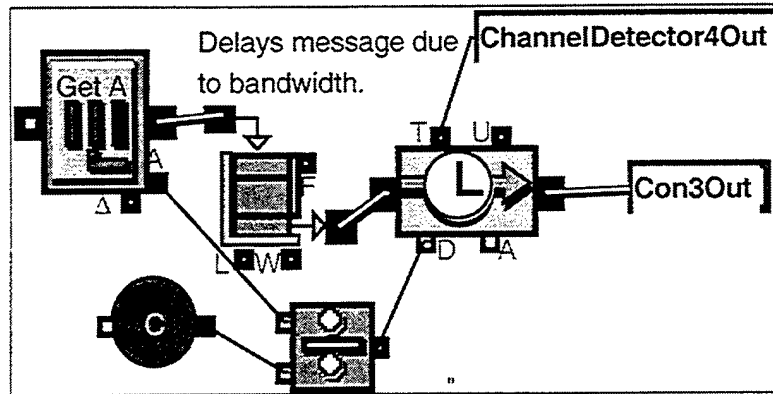
First in, first out queue.

OK Cancel

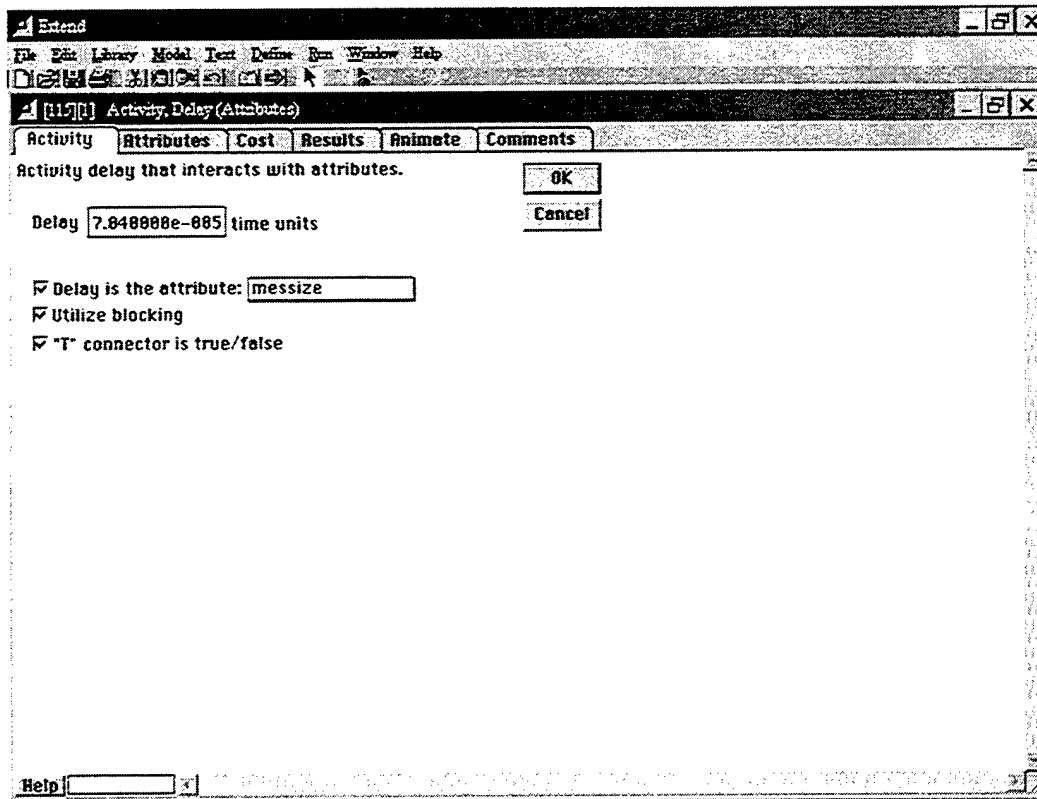
Ave. length:	6.629867e-087	Length:	8
Ave. wait:	4.448748e-088	Arrivals:	14981
Max. length:	2	Departures:	14981
Max. wait:	6.711357e-085	Utilization:	6.629867e-087
Total cost:	8		

Help

FIFO Queue for the Arrivals and Departures Messages

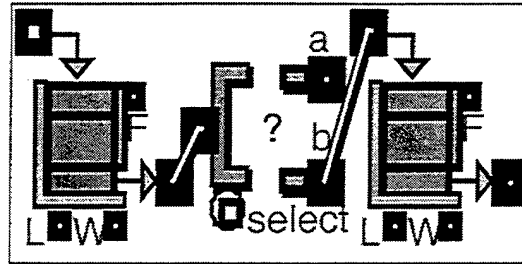


Bandwidth Delay Within the Ethernet Bus by CAT-5 UTP 100 Mbps



Activity Delay Dialog Box





LAN Select Output

Extend

File Edit Library Model Text Define Run Window Help

729 Select:DB Output

Select Output **Animate** Comments

Selects one of two outputs.

One of every  items goes to the bottom output unless "select" is connected.

OK Cancel

If connected, "select":

Top output is chosen by "select" =

Bottom output is chosen by "select" =

Invalid "select" value:

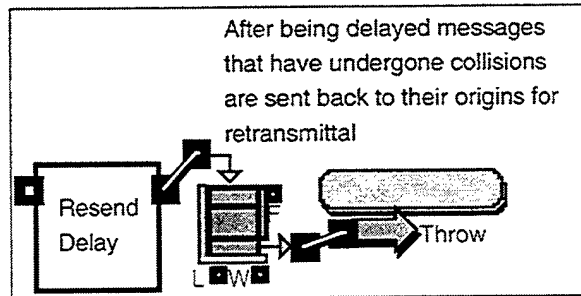
☒ Decision is made before item enters Select block

☐ Item enters Select block before decision is made

Blocked:

Help

Select Output Dialog Box



Messages Thrown for Retransmittal

Extend

File Edit Library Model Text Define Run Window Help

[250] Throw

Specify catch block Comments

Sends items to a Catch block without using connections

OK

Cancel

For Catch block group: NODE 1

☒ Specify Catch block by label

[451]

☐ Specify Catch block by attribute value

Attribute name: NODE 1

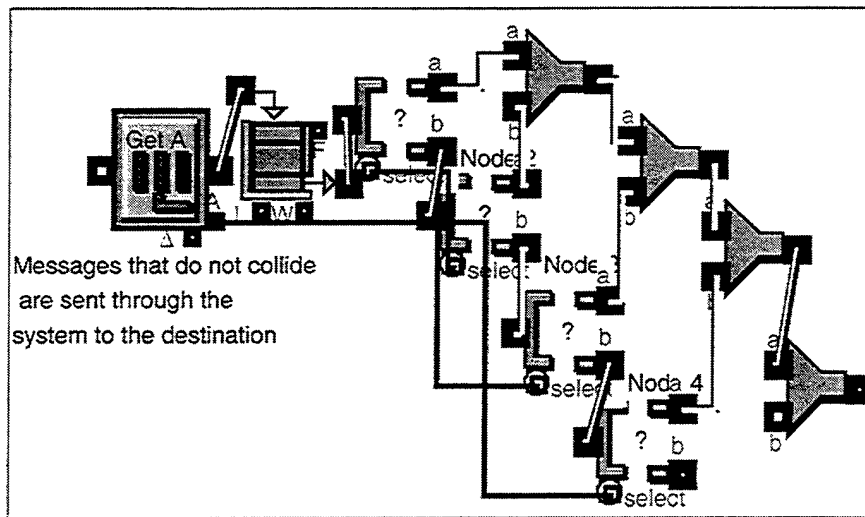
	Attrib Value	[Catch Block]	Departures
0			
1			
2			
3			
4			
5			

Sort Table

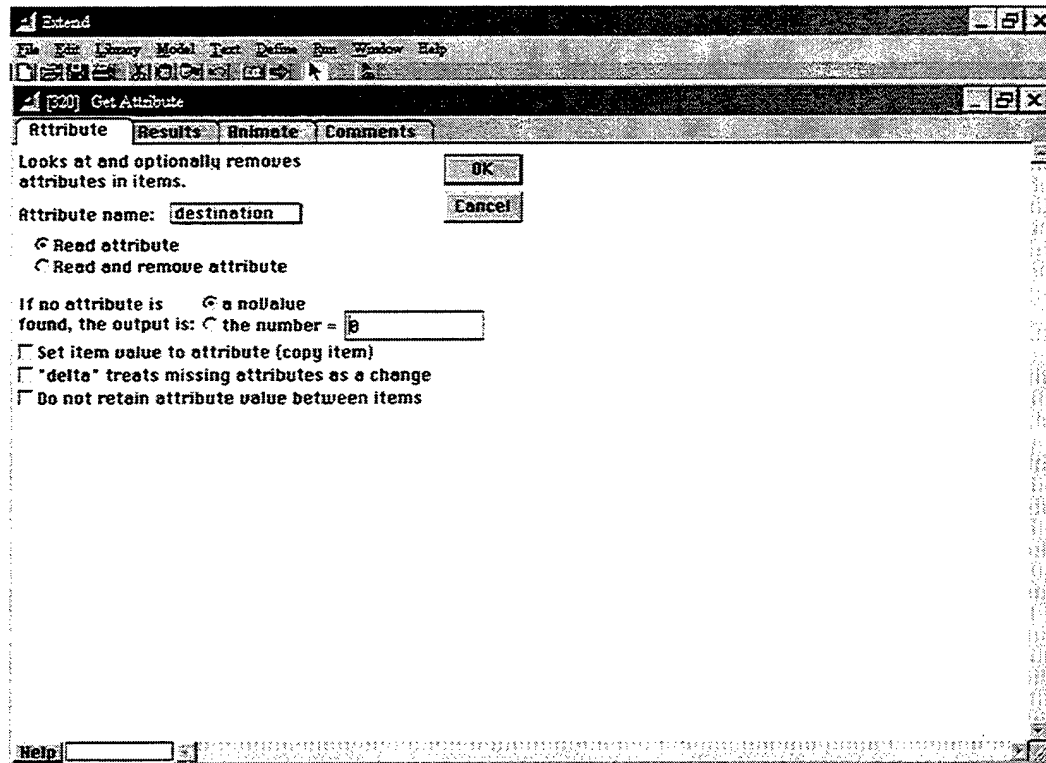
☒ Also show Catch block numbers

Help

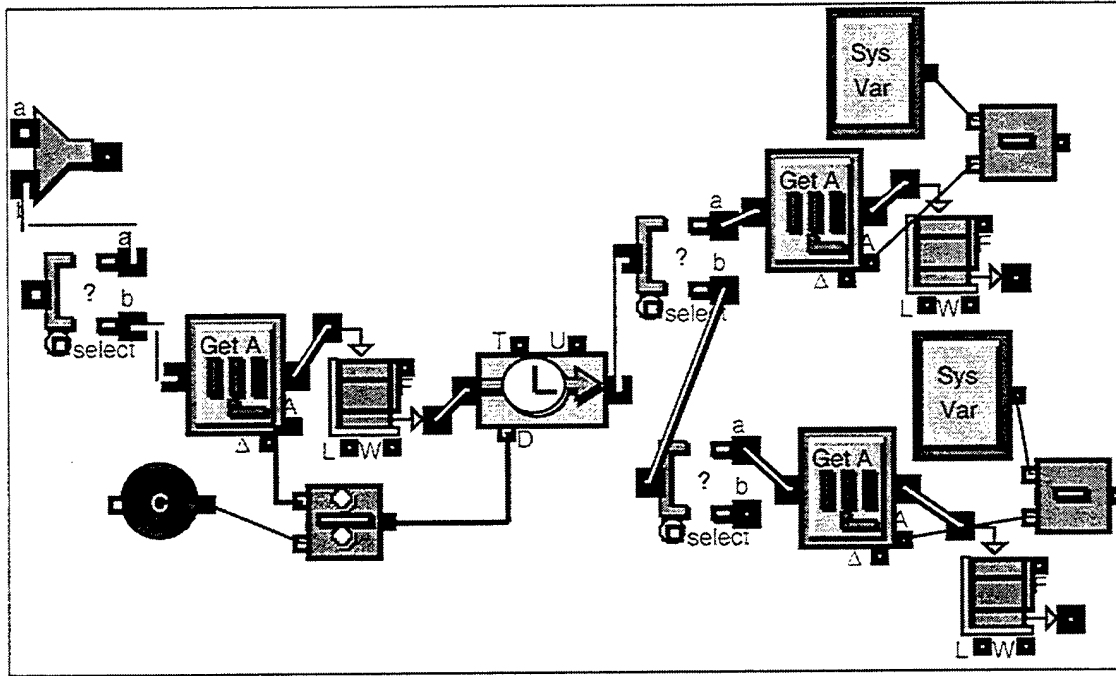
Throw Block Dialog Box



Get Attribute Messages Destination and the Router



Get Attribute Dialog Box

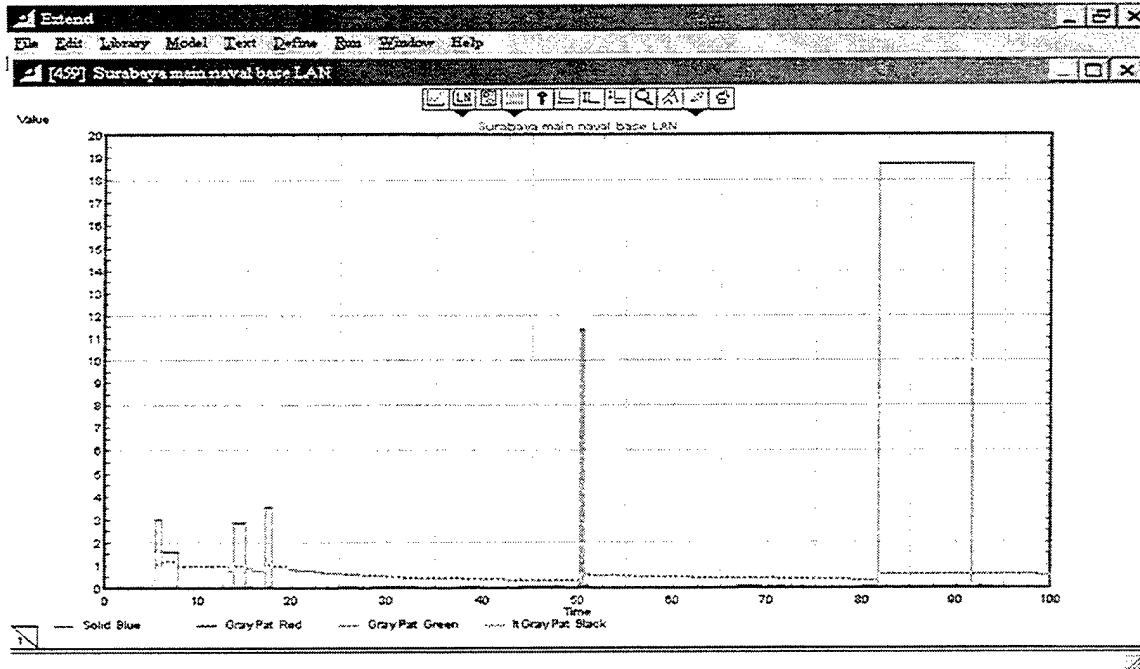


Bandwidth Delay Within the WAN by ISDN/T1 Line Connection Service

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## **APPENDIX B. NETWORK TRAFFIC TESTS AND SIMULATION RUNS DATA**

This appendix contains the result of our network traffic tests and simulation runs. The graph displays the delay experienced within each of the tested network design over the period of the model. The data shows the arrival time of the message and the delay associated with the message using ISDN 128 Kbps, and T1 line 1.544 Mbps.

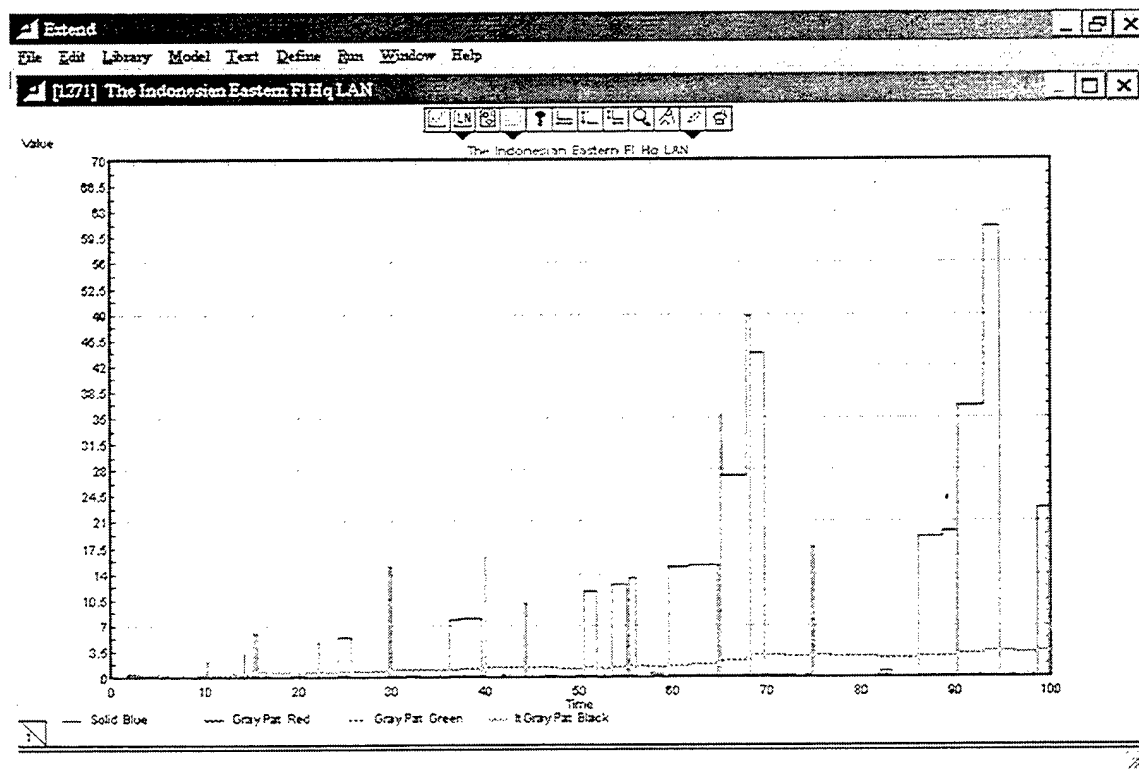


Run 0, The 1<sup>st</sup> LAN, Using Simulation Set Up 100, Mean 1 sec, ISDN 128 Kbps

Point Number	Time	1: Solid Blue	2: GrayPat Red	3: GrayPat Green	4: It GrayPat Black
0	1.4839893227476	0.0667091462087			
1	5.3463593680015	7.0400000e-005			
2	5.414151075	2.5960155852411			
3	6.0036753	1.5885371182032			
4	7.8604522727035	7.0400000e-005			
5	13.762674625	2.8375306060908			
6	14.838487254635	0.03649946			
7	15.802679440186	7.0400000e-005			
8	17.10719795	3.5106436588032			
9	17.80380591913	7.0400000e-005			
10	25.409620568905	0.03949946			
11	26.78536752689	7.0400000e-005			
12	28.694224709357	0.0272571			
13	28.804840059128	7.0400000e-005			
14	29.982800012083	0.0272571			
15	31.877877171182	7.0400000e-005			
16	32.198035707	0.0272571			
17	33.022516080043	7.0400000e-005			
18	38.053844175507	0.0272571			
19	38.747754879814	0.03649946			
20	39.461074053754	7.0400000e-005			
21	43.783034005671	0.0465786434656			
22	46.175112595779	7.0400000e-005			
23	46.29188867626	0.076960038653			
24	47.39524239751	0.0467418			
25	48.468102922299	7.0400000e-005			
26	50.278299625	11.3810308196			
27	50.56258925	0.0838418245013			
28	51.232281500604	7.0400000e-005			
29	68.880203101359	0.0933081044053			
30	69.434826753335	7.0400000e-005			
31	70.347520475	0.0693620315259			
32	70.610742370986	7.0400000e-005			
33	71.099280153436	0.0272571			
34	71.718386946015	0.0467418			
35	71.856222079251	7.0400000e-005			
36	73.57087991816110993709				

Run 0, Data Delay within the 1<sup>st</sup> LAN

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya main naval base LAN									
Point Number	Time	1 - Solid Bl	2 - Time	2 - GravPat	3 - Time	3 - GravPat	4 - Time	4 - ItGrayPa	
35	73.8709795	0.0518106603706			25.409920568305	0.5317515671919			
37	73.902253259312	7.040000004-005			26.78638752689	0.5817552724651			
38	76.776054360538	0.03549946			26.78638752689	0.5526675089323			
39	75.776221894409	7.040000004-005			27.325796744631	0.5526710286323			
40	79.863837346108	0.0404496382334			27.325796744631	0.5262533507927			
41	81.501582875001	13.690651974831			28.594224709357	0.5276513179356			
42	91.700741952313	7.040000004-005			29.594224709357	0.5035871671203			
43	92.321648352212	0.0172571			29.804640556123	0.5035871671203			
44	93.910629465876	7.040000004-005			29.804640556123	0.4817716555084			
45	100	7.040000004-005			29.80300012083	0.4829567468107			
46					29.80300012083	0.482933546027			
47					31.877877171162	0.4828054823693			
48					31.877877171162	0.4443230230659			
49					32.1992035707	0.4464133070659			
50					32.1992035707	0.4282820255249			
51					32.022519080043	0.42828247337172			
52					33.022519080043	0.4124223361721			
53					34.350446135712	0.4124249435795			
54					34.350446135712	0.3976954813068			
55					37.87976773639	0.3976954813068			
56					37.87976773639	0.2839842718035			
57					38.053844175507	0.3849241718035			
58					38.053844175507	0.3729933959882			
59					38.747754878314	0.3730100142216			
60					38.747754878314	0.3512677558933			
61					39.461074053754	0.351270026666			
62					39.461074053754	0.3469803333327			
63					42.475029075474	0.3469825333327			
64					42.475029075474	0.3393770068681			
65					43.763034005671	0.3407914004095			
66					43.763034005671	0.3307681728504			
67					46.175112595779	0.3307702432386			
68					46.175112595779	0.3213106648804			
69					46.291838067636	0.3225193792608			
70					46.291838067636	0.3146327298272			
71					47.395224239751	0.3146303252827			
72					47.395224239751	0.3077681101079			



Run 0, The 2<sup>nd</sup> LAN, Using Simulation Set Up 100, Mean 1 sec, ISDN 128 Kbps

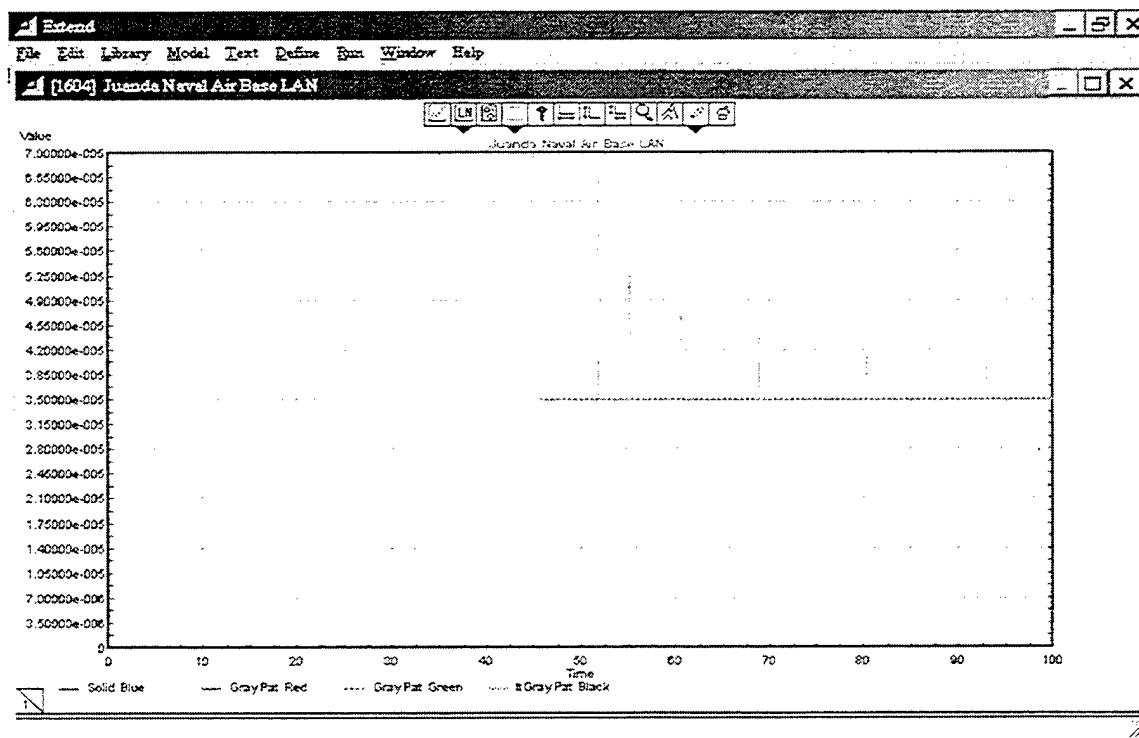


Extend									
File Edit Library Model Text Define Run Window Help									
[271] The Indonesian Eastern FHq LAN									
Point Numbers	Time	1: Solid B...	2: Time	2:1 GrayPat ...	3: Time	3: GrayPat ...	4: Time	4:1 GrayPa...	
0	0.0001658	0.0001658			0.0001658	0.0001658			
1	0.09154705	0.09154705			0.09154705	0.09154705			
2	0.1185543	0.1185543			0.09154705	0.046556425			
3	0.224973093914	0.29000000e-005			0.1185543	0.105132575			
4	1.2505446362151	0.0675483849696			0.1185543	0.07006905			
5	1.4011851833485	0.29000000e-005			0.224973093914	0.0701186833353			
6	1.75554705	0.292513220446			0.224973093914	0.0925875125			
7	2.9594833171456	0.29000000e-005			1.2805446362151	0.0654741087499			
8	3.3433383	0.1135823065307			1.2805446362151	0.0555792369999			
9	4.78292425	0.08994912301122			1.4011851833485	0.0555958692999			
10	5.636843825	0.2246781468796			1.4011851833485	0.0463298361856			
11	6.0565213208905	0.0568831939746			1.4946030370134	0.0463437058333			
12	8.1505414494026	0.29000000e-005			1.4946030370134	0.0397231764285			
13	9.291850475	0.1032018317638				1.75554705	0.0815305081492		
14	10.24743386225	0.29000000e-005				1.75554705	0.0713391946305		
15	10.308653	2.0099468512013			2.9594833171456	0.0713405571305			
16	10.31895001393	0.29000000e-005			2.9594833171456	0.0834218285605			
17	13.059189775	0.3127742812447				3.3433383	0.0760420848416		
18	13.42282249318	0.29000000e-005				3.3433383	0.0594078763575		
19	14.22025275	0.047289239638				4.78292425	0.0774327889898		
20	14.260867425	0.1351833550055				4.78292425	0.0703934442353		
21	15.22873855	0.6433854118871				5.636843825	0.0808187303152		
22	15.241864325	0.8424458184815				5.636843825	0.08232502788		
23	15.85645523713	0.29000000e-005			6.0565213208905	0.087960769935			
24	16.12538438975	0.29000000e-005			6.0565213208905	0.081222482848			
25	16.31474385	0.1464074204065			8.1505414494026	0.081226251879			
26	16.777102581913	0.29000000e-005			8.1505414494026	0.0754255805316			
27	19.18156278827	0.1069690758203				9.291850475	0.0827813999408		
28	20.644803197221	0.29000000e-005				9.291850475	0.0772792639494		
29	22.121123625	4.6280403842131				10.24743386225	0.0772637906181		
30	22.146548355143	0.29000000e-005				10.24743386225	0.0724635537026		
31	24.314705875	5.3005845005083				10.308653	0.0807541940439		
32	25.540420539375	0.29000000e-005				10.308653	0.1864239241486		
33	29.540374161085	14.897466823589				10.31895001393	0.1864288005201		
34	29.633409226085	0.195928117406				10.31895001393	0.1760716450301		
35	30.12919551847	0.29000000e-005				10.65091538884	0.176072505857		
36	30.353132326085	0.4203151422017				10.65091538884	0.16688912808		

Run 0, Data Delay within the 2<sup>nd</sup> LAN

Extend									
File Edit Library Model Text Define Run Window Help									
[271] The Indonesian Eastern FHq LAN									
Point Numbers	Time	1: Solid B...	2: Time	2:1 GrayPat ...	3: Time	3: GrayPat ...	4: Time	4:1 GrayPa...	
36	30.353132326085	0.4203151422017			10.65091538884	0.16688912808			
37	30.549318049548	0.29000000e-005			12.186404633359	0.1868134425601			
38	31.69034435	0.165069159268			12.186404633359	0.1584727705271			
39	32.846360947444	0.29000000e-005				13.089186775	0.1741114846894		
40	36.112284	7.7581705669546				13.089186775	0.1658204815137		
41	37.1589715	7.8746025899128				13.42282249319	0.1658244001327		
42	39.485031354347	0.3441706839132				13.42282249319	0.158285359903		
43	39.631413804347	0.282955951427				14.22025275	0.2968000552628		
44	40.026303229347	15.139528347892				14.22025275	0.283995705034		
45	40.041912713935	0.29000000e-005				14.260867425	0.2897723726429		
46	41.768228943673	0.3229462561508				14.260867425	0.277698227828		
47	42.060235812386	0.29000000e-005				15.22873855	0.5128387462773		
48	43.544127250409	0.0551408				15.22873855	0.4823251990082		
49	44.197518375	9.8830939594741				15.241864325	0.7260630360446		
50	44.32943742348	0.29000000e-005				15.241864325	0.6981379346583		
51	46.732272909321	0.0551408				15.85645523713	0.0981407231198		
52	46.403820929347	0.1901693805936				15.85645523713	0.6722838593008		
53	46.440238973347	0.0981657031527				16.16538438975	0.572286729671		
54	47.527891348505	0.29000000e-005				16.16538438975	0.6482764883256		
55	49.650423325	0.161475483622				16.31474385	0.6535053257837		
56	49.885541854836	0.29000000e-005				16.31474385	0.8309708563628		
57	50.143174275	0.1244691179694				16.777102581913	0.8309735179825		
58	50.46305625	11.481368034616				16.777102581913	0.8099410870841		
59	51.802456327218	0.29000000e-005				18.558284083871	0.6099438307174		
60	53.483351108416	12.541880732846				18.558284083871	0.590286232746		
61	55.014258198872	0.29000000e-005				19.18156278827	0.5938158128189		
62	55.16800825	0.3371350765888				19.18156278827	0.5762588740193		
63	55.248407075	13.31002961352				20.644803197221	0.5752614655413		
64	56.04851582994	0.29000000e-005				20.644803197221	0.557829299189		
65	57.2871361	0.06889818343				22.121123625	0.6880726478253		
66	57.71471813218	0.29000000e-005				22.121123625	0.6775413906334		
67	57.507432525	0.5041148657828				22.146548355143	0.6775403286887		
68	58.072444325	0.4170324213738				22.146548355143	0.6581854337592		
69	58.883255407651	0.29000000e-005				22.582593844638	0.6581878025296		
70	59.4094085	0.0806211487484				22.582593844638	0.6399048078204		
71	59.523780175	14.77187252858				24.314705875	0.7871432861879		
72	61.741931	15.044991635776				24.314705875	0.78688812808		

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FHq LAN									
Point Numbers	1 Time	1 Solid Bl...	2 Time	2 GrayPat ...	3 Time	3 GrayPat ...	4 Time	4 NGrayPa...	
72	81.7413621	15.044281535228			24.314705875	0.765889123829			
73	84.68008850704	8.29000000e-005			25.540420589275	0.7658710843798			
74	85.67112486	5.147438759838			25.540420589275	0.7467188547908			
75	85.158155175	27.119733406240			25.524178684869	0.7467190353698			
76	87.7083886	48.570181059737			25.524178684869	0.723598035407			
77	88.130764764746	0.0561408			26.56337175483	0.72359801810781			
78	88.229392375	42.522415921718			26.56337175483	0.7084051570511			
79	89.64423725	0.2229487642593			27.03802000381	0.7084051226611			
80	70.083918525	0.1728012065858			27.03802000381	0.6811582727328			
81	70.475444825	0.115735353158			27.48596078504	0.6811582727328			
82	71.87112405	0.1558823739485			27.48596078504	0.6747040971915			
83	73.082406889284	8.29000000e-005			27.940147012488	0.6747040971915			
84	74.16508085	0.2232018352921			27.940147012488	0.6562152221408			
85	74.78963956	17.410958212598			28.51779852588	0.6562171500476			
86	74.937089040391	0.0544794			28.51779852588	0.6440394970192			
87	75.094252535488	8.29000000e-005			29.840374151085	0.8823807860371			
88	78.552625402208	0.0544794			29.840374151085	0.8605588501252			
89	78.812438443992	8.29000000e-005			29.803409228085	0.8640104191839			
90	79.718205741465	0.0784615898906			29.803409228085	0.8428375288398			
91	89.847451479477	8.29000000e-005			30.12918551847	0.843938308125			
92	81.771397501465	0.1170542230242			30.12918551847	0.8208555152833			
93	82.158114928922	0.7214871958746			30.353122328085	0.8327993908293			
94	82.227114575283	8.29000000e-005			30.353122328085	0.8133850408246			
95	89.117852825001	19.828586718375			30.548318048548	0.8133850408246			
96	88.670120300001	18.661835238448			30.548318048548	0.8947286787598			
97	89.143165587709	8.29000000e-005			31.56034438	0.8880954387111			
98	89.204039855881	35.547957238885			31.56034438	0.8601325279789			
99	92.972194075001	83.798432110541			32.846580947444	0.86013251859789			
100	94.682312500131	8.29000000e-005			32.846580947444	0.8828776233107			
101	95.817082975001	0.0921523344856			34.172138382540	0.8528782588006			
102	95.34388592689	8.29000000e-005			34.172138382540	0.8462854268006			
103	99.194093752124	0.1437838813002			35.688830842572	0.8462854268006			
104	98.538781265483	0.0544794			35.688830842572	0.8203193414878			
105	98.577072525002	22.982594325561			36.112284	0.8768992182226			
106	99.970248100002	0.4848688024082			36.112284	0.9586128827			
107	100	0.4848688024082			37.1569715	1.10444444121428			
108					37.1569715	1.0843939049423			



Run 0, The 3<sup>rd</sup> LAN,

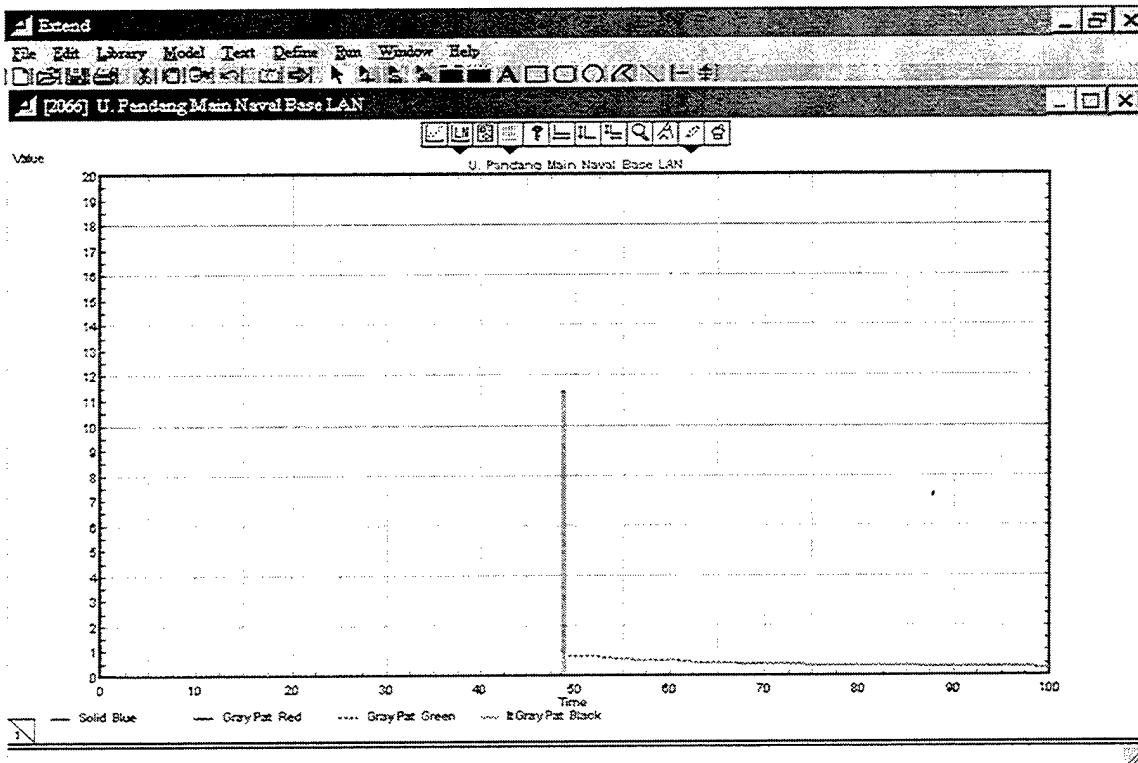
Extend

File Edit Library Model Text Define Run Window Help

[1604] Juanda Naval Air Base LAN

Point Number	Time	1: Solid Bl...	2: Time	2: GrayPat ...	3: Time	3: GrayPat ...	4: Time	4: ItGrayPa...
0	46.890473280708	3.48000000e-005			46.890473280708	3.48000000e-005		
1	68.985227188559	3.48000000e-005			51.937724715879	6.86000000e-005		
2	120	3.48000000e-005			51.937724715879	3.48000000e-005		
3					55.350733855784	5.22000000e-005		
4					55.350733855784	3.48000000e-005		
5					60.598248807256	4.84000000e-005		
6					60.598248807256	3.48000000e-005		
7					68.985227188559	4.35000000e-005		
8					68.985227188559	3.48000000e-005		
9					71.409900810384	4.17600000e-005		
10					71.409900810384	3.48000000e-005		
11					80.470427143154	4.05000000e-005		
12					80.470427143154	3.48000000e-005		
13					87.876599494899	3.97714286e-005		
14					87.876599494899	3.48000000e-005		
15					92.841392162617	3.91500000e-005		
16					92.841392162617	3.48000000e-005		
17					120	3.48000000e-005		

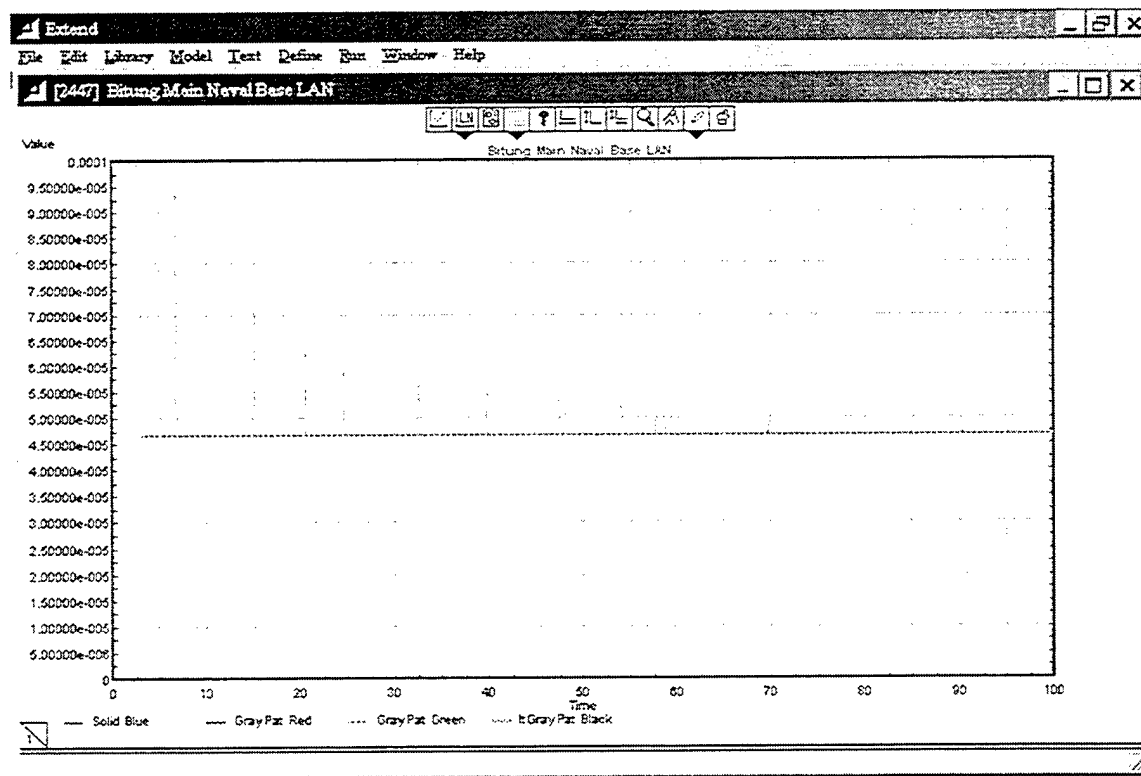
Run 0, Data Delay within the 3<sup>rd</sup> LAN



Run 0, The 4<sup>th</sup> LAN

Point Number	Time	1-Solid Bl...	2-Time	2-GrayPat...	3-Time	3-GrayPat...	4-Time	4-ItGrayPa...
0	1.7811373798256	5.84000000e-005			1.7811373798256	5.84000000e-005		
1	5.1007359095213	5.84000000e-005			5.1007359095213	0.0001168		
2	48.745869025	11.32830309007			5.1007359095213	5.84000000e-005		
3	49.028048526048	5.84000000e-005			6.3135915244311	8.76000000e-005		
4	100	5.84000000e-005			6.3135915244311	5.84000000e-005		
5					17.522907117614	7.78666667e-005		
6					17.522907117614	5.84000000e-005		
7					19.650544875672	7.30000000e-005		
8					19.650544875672	5.84000000e-005		
9					25.626744085757	7.09800000e-005		
10					25.626744085757	5.84000000e-005		
11					25.100928175414	8.81333333e-005		
12					25.100928175414	5.84000000e-005		
13					30.647082204293	6.67428571e-005		
14					30.647082204293	5.84000000e-005		
15					31.254192918378	6.57000000e-005		
16					31.254192918378	5.84000000e-005		
17					37.025147069093	6.48833333e-005		
18					37.025147069093	5.84000000e-005		
19					39.513623951746	6.42400000e-005		
20					39.513623951746	5.84000000e-005		
21					43.427681477019	6.37080000e-005		
22					43.427681477019	5.84000000e-005		
23					45.754319583505	6.32866667e-005		
24					45.754319583505	5.84000000e-005		
25					48.75869025	0.871351350823		
26					48.75869025	0.8091119707193		
27					49.028048526048	0.8091119707193		
28					49.028048526048	0.7551750560047		
29					52.63179126039	0.7551750560047		
30					52.63179126039	0.7079802743794		
31					52.63179126039	0.7079802743794		
32					50.951893738048	0.6583378111806		
33					55.176308110574	0.6583378111806		
34					55.176308110574	0.6293222883072		
35					55.889652795052	0.6293222883072		

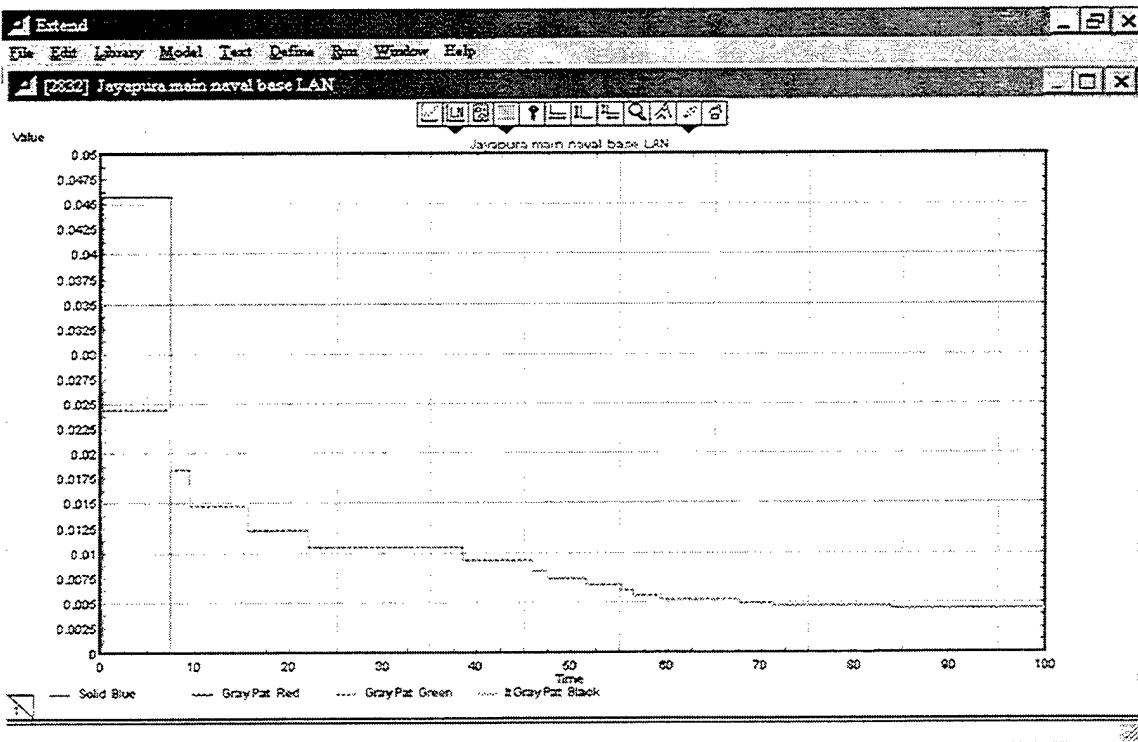
Run 0, Data Delay within the 4<sup>th</sup> LAN



Run 0, The 5<sup>th</sup> LAN

Extend							
File Edit Library Model Text Define Run Window Help							
[2447] Bitung Main Naval Base LAN							
Point Number	Time	1: Solid Blue	2: Time	3: GrayPat	4: Time	5: GrayPat	6: Time
0	3.2794873782353	4.66000000e-005			3.2794873782353	4.66000000e-005	
1	15.2172222985909	4.66000000e-005			5.872599751082	9.32000000e-005	
2	20.527361774974	4.66000000e-005			5.872599751082	4.66000000e-005	
3	32.560534884299	4.66000000e-005			15.2172222985909	4.66000000e-005	
4	69.726706383541	4.66000000e-005			15.2172222985909	4.66000000e-005	
5	100	4.66000000e-005			20.527361774974	5.21333333e-005	
6					20.527361774974	4.66000000e-005	
7					24.709544714161	5.82500000e-005	
8					24.709544714161	4.66000000e-005	
9					32.560534884299	5.59200000e-005	
10					32.560534884299	4.66000000e-005	
11					39.879379320757	5.43666667e-005	
12					39.879379320757	4.66000000e-005	
13					47.477306184686	5.22571429e-005	
14					47.477306184686	4.66000000e-005	
15					48.254689850254	5.24250000e-005	
16					48.254689850254	4.66000000e-005	
17					54.098410366473	5.17777778e-005	
18					54.098410366473	4.66000000e-005	
19					57.878772614768	5.12600000e-005	
20					57.878772614768	4.66000000e-005	
21					58.785406894046	5.08363536e-005	
22					58.785406894046	4.66000000e-005	
23					69.726706383541	5.04833333e-005	
24					69.726706383541	4.66000000e-005	
25					69.726706383541	5.01846154e-005	
26					69.726706383541	4.66000000e-005	
27					78.143812371603	4.99285714e-005	
28					78.143812371603	4.66000000e-005	
29					90.234282301982	4.97098967e-005	
30					90.234282301982	4.66000000e-005	
31					100	4.66000000e-005	

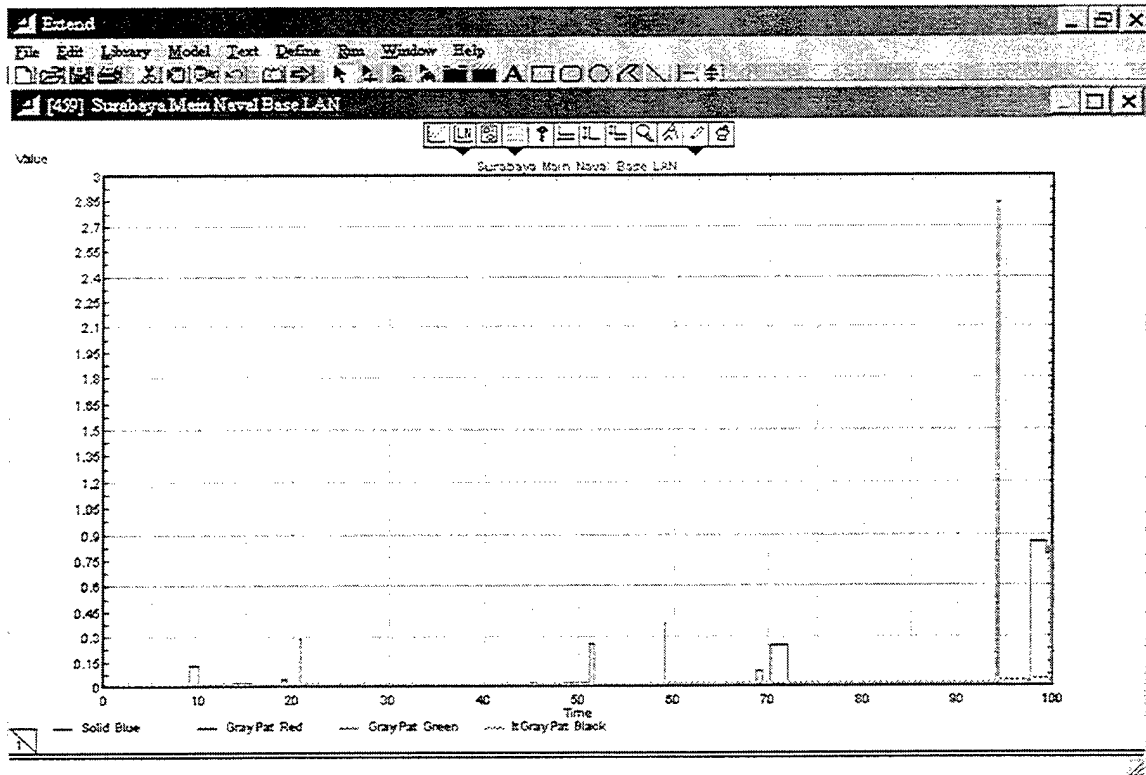
Run 0, Data Delay within the 5<sup>th</sup> LAN



Run 0, The 6<sup>th</sup> LAN

Extend									
File Edit Library Model Text Define Run Window Help									
[2832] Jayapura main naval base LAN									
Point Number	Time	1. Solid B...	2. Time	2. GravPat...	3. Time	3. GravPat...	4. Time	4. GravPa...	
0	4.65000000e-005	4.65000000e-005			4.65000000e-005	4.65000000e-005			
1	0.0272571	0.0272571			0.0272571	0.0273037			
2	0.0467418	0.0467418			0.0272571	0.01365185			
3	7.514627989049	4.65000000e-005			0.0467418	0.03552275			
4	9.60220325364	4.65000000e-005			0.0467418	0.0240485			
5	21.988264809556	4.65000000e-005			7.514627989049	0.0243840333333			
6	38.611095411283	4.65000000e-005			7.514627989049	0.018273025			
7	67.710658184748	4.65000000e-005			9.60220325364	0.018284675			
8	100	4.65000000e-005			9.60220325364	0.01462774			
9					15.55943306377	0.01463795			
10					15.55943306377	0.01218755			
11					21.988264809556	0.0122053166657			
12					21.988264809556	0.0104617			
13					38.611095411283	0.0104683571429			
14					38.611095411283	0.0091598125			
15					46.005046152927	0.0091555375			
16					46.005046152927	0.0081472333333			
17					47.830628270973	0.0081524111111			
18					47.830628270973	0.00733717			
19					51.56463423346	0.00734183			
20					51.56463423346	0.0066743909091			
21					55.282819607517	0.0066788272727			
22					55.282819607517	0.006122075			
23					58.559172559527	0.0061259682222			
24					58.559172559527	0.0056547307692			
25					59.222276355204	0.0056583153846			
26					59.222276355204	0.00535415			
27					67.710658184748	0.0052574789714			
28					67.710658184748	0.00460633			
29					71.413182727845	0.0046100886667			
30					71.413182727845	0.00460320625			
31					83.902275910329	0.00460911875			
32					83.902275910329	0.0043351705882			
33					100	0.0043351705882			

Run 0, Data Delay within the 6<sup>th</sup> LAN



Run 1, The 1<sup>st</sup> LAN, Using Simulation Set Up 100, Mean 1 sec, T1 Line 1.544 Mbps

Point Number Time 1: Solid Bl... 2: Time 2: GrayPat... 3: Time 3: GrayPat... 4: Time 4: It GrayPa...

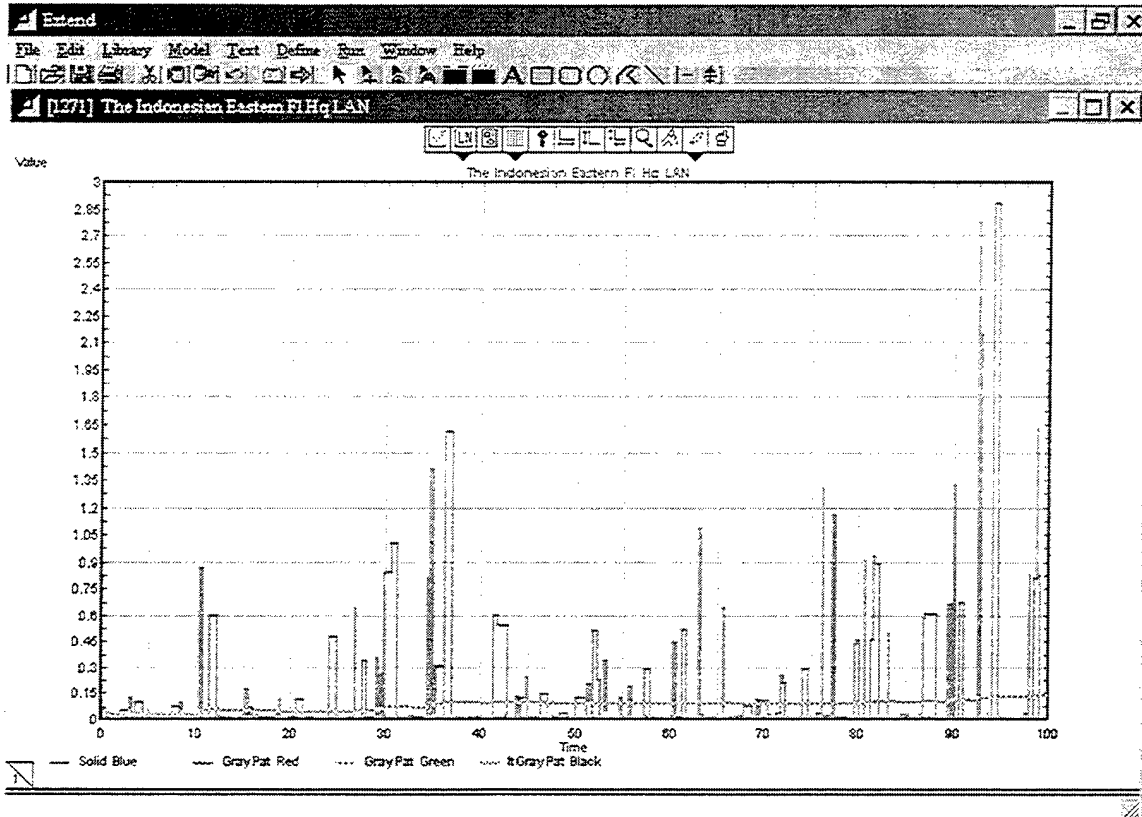
0	0.472200470396	0.004010133333	0.472200470396	0.004010133333	0.472200470396	0.004010133333	0.472200470396	0.004010133333
1	1.3355950500854	7.04000000e-005	1.3355950500854	7.04000000e-005	1.3355950500854	7.04000000e-005	1.3355950500854	7.04000000e-005
2	2.0630800978727	7.04000000e-005	2.0630800978727	7.04000000e-005	2.0630800978727	7.04000000e-005	2.0630800978727	7.04000000e-005
3	3.0022088534578	0.0023896	3.0022088534578	0.0023896	3.0022088534578	0.0023896	3.0022088534578	0.0023896
4	4.0877202264432	7.04000000e-005	4.0877202264432	7.04000000e-005	4.0877202264432	7.04000000e-005	4.0877202264432	7.04000000e-005
5	5.4722085437412	0.0023896	5.4722085437412	0.0023896	5.4722085437412	0.0023896	5.4722085437412	0.0023896
6	5.1977778	0.0032280119328	5.1977778	0.0032280119328	5.1977778	0.0032280119328	5.1977778	0.0032280119328
7	5.3706094053194	7.04000000e-005	5.3706094053194	7.04000000e-005	5.3706094053194	7.04000000e-005	5.3706094053194	7.04000000e-005
8	7.6514570666655	0.0034740317563	7.6514570666655	0.0034740317563	7.6514570666655	0.0034740317563	7.6514570666655	0.0034740317563
9	7.852978832411	0.004010133333	7.852978832411	0.004010133333	7.852978832411	0.004010133333	7.852978832411	0.004010133333
10	8.193835410911	7.04000000e-005	8.193835410911	7.04000000e-005	8.193835410911	7.04000000e-005	8.193835410911	7.04000000e-005
11	9.0862546999999	0.1248242858553	9.0862546999999	0.1248242858553	9.0862546999999	0.1248242858553	9.0862546999999	0.1248242858553
12	9.9534708529723	7.04000000e-005	9.9534708529723	7.04000000e-005	9.9534708529723	7.04000000e-005	9.9534708529723	7.04000000e-005
13	9.9920589134638	0.0023896	9.9920589134638	0.0023896	9.9920589134638	0.0023896	9.9920589134638	0.0023896
14	10.184764078995	7.04000000e-005	10.184764078995	7.04000000e-005	10.184764078995	7.04000000e-005	10.184764078995	7.04000000e-005
15	11.2348704	0.0078239641192	11.2348704	0.0078239641192	11.2348704	0.0078239641192	11.2348704	0.0078239641192
16	11.871100484421	7.04000000e-005	11.871100484421	7.04000000e-005	11.871100484421	7.04000000e-005	11.871100484421	7.04000000e-005
17	12.580389306405	0.004010133333	12.580389306405	0.004010133333	12.580389306405	0.004010133333	12.580389306405	0.004010133333
18	12.772128320168	7.04000000e-005	12.772128320168	7.04000000e-005	12.772128320168	7.04000000e-005	12.772128320168	7.04000000e-005
19	13.5271308	0.0032091184757	13.5271308	0.0032091184757	13.5271308	0.0032091184757	13.5271308	0.0032091184757
20	13.758501633334	0.0175013984622	13.758501633334	0.0175013984622	13.758501633334	0.0175013984622	13.758501633334	0.0175013984622
21	15.78507205386	0.0023896	15.78507205386	0.0023896	15.78507205386	0.0023896	15.78507205386	0.0023896
22	16.0005989035	0.00371792577	16.0005989035	0.00371792577	16.0005989035	0.00371792577	16.0005989035	0.00371792577
23	16.27732268512	0.0023896	16.27732268512	0.0023896	16.27732268512	0.0023896	16.27732268512	0.0023896
24	17.357918930834	7.04000000e-005	17.357918930834	7.04000000e-005	17.357918930834	7.04000000e-005	17.357918930834	7.04000000e-005
25	18.228670741958	0.0031998586657	18.228670741958	0.0031998586657	18.228670741958	0.0031998586657	18.228670741958	0.0031998586657
26	18.944168180427	0.0031476796283	18.944168180427	0.0031476796283	18.944168180427	0.0031476796283	18.944168180427	0.0031476796283
27	19.324796946883	7.04000000e-005	19.324796946883	7.04000000e-005	19.324796946883	7.04000000e-005	19.324796946883	7.04000000e-005
28	19.547341637215	0.0031998586657	19.547341637215	0.0031998586657	19.547341637215	0.0031998586657	19.547341637215	0.0031998586657
29	20.74636876572	7.04000000e-005	20.74636876572	7.04000000e-005	20.74636876572	7.04000000e-005	20.74636876572	7.04000000e-005
30	20.752598527094	0.2383893163321	20.752598527094	0.2383893163321	20.752598527094	0.2383893163321	20.752598527094	0.2383893163321
31	20.900294317506	7.04000000e-005	20.900294317506	7.04000000e-005	20.900294317506	7.04000000e-005	20.900294317506	7.04000000e-005
32	22.755056537811	0.006123041787	22.755056537811	0.006123041787	22.755056537811	0.006123041787	22.755056537811	0.006123041787
33	22.76558843581	7.04000000e-005	22.76558843581	7.04000000e-005	22.76558843581	7.04000000e-005	22.76558843581	7.04000000e-005
34	32.557921071452	0.0023896	32.557921071452	0.0023896	32.557921071452	0.0023896	32.557921071452	0.0023896

Run 1, Data Delay within the 1<sup>st</sup> LAN

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya Main Naval Base LAN									
Point Number	Time	1 - Solid Bl...	2 - Time	3 - GravPat...	4 - Time	5 - GravPat...	6 - Time	7 - GravPat...	8 - It GravPa...
35	33.213046486554	0.0031998555557			12.147754071421	0.0085167977931			
36	35.563821157793	7.04000000e-005			12.147754071421	0.0081632821227			
37	36.10620235125	0.0031998555557			12.580386308405	0.0083740417718			
38	38.278544088032	7.04000000e-005			12.580386308405	0.0079556246832			
39	38.898095469734	0.0031998555557			12.772128320158	0.0079591446832			
40	40.237595771577	0.0023896			12.772128320158	0.0075801377935			
41	40.780511200424	7.04000000e-005			12.796198528285	0.0075834401748			
42	41.79780534432	0.0031998555557			12.796198528285	0.0072387860758			
43	44.783511028937	7.04000000e-005			13.404818851446	0.0072412860758			
44	47.975763593782	0.0135952289911			13.404818851446	0.0069271171158			
45	46.660767743762	0.0047758533717			13.5271308	0.007066440061			
46	46.904637279341	7.04000000e-005			13.5271308	0.006772200598			
47	46.535695484158	0.0031998555557			13.759501533334	0.0075014254413			
48	46.538886150824	0.00438687031			13.759501533334	0.0072012684237			
49	46.794424237838	7.04000000e-005			15.765027205288	0.0072859524237			
50	48.414658525797	0.0141594204781			15.765027205288	0.0070153004074			
51	51.197140714321	0.248747824885			16.0905989035	0.0071592875524			
52	51.820715973833	0.0040191333333			16.0905989035	0.006841583828			
53	51.821824292899	7.04000000e-005			18.277202266513	0.006826423875			
54	51.108758855113	0.0031998555557			18.277202266513	0.006733250128			
55	52.522102007825	7.04000000e-005			18.306728771135	0.0068186048701			
56	55.557350447615	0.00335732788			18.306728771135	0.0065830485542			
57	58.38284156031	7.04000000e-005			17.357818930834	0.006583081504			
58	59.007458280548	0.372850230681			17.357818930834	0.0063853778187			
59	59.137706114281	0.0041406782837			17.48828771215	0.006387246454			
60	59.221864150705	7.04000000e-005			17.48828771215	0.0061832818181			
61	60.932592630088	0.0040191333333			17.537348589202	0.0061859527859			
62	62.440440572817	7.04000000e-005			17.537348589202	0.0059728762613			
63	64.420147053444	0.0023896			18.238670741888	0.0060728750946			
64	64.84013059175	7.04000000e-005			18.238670741888	0.005888485786			
65	66.53202755607	0.0040191333333			19.044158180427	0.0070751418987			
66	67.12827174885	0.0023896			19.044158180427	0.0068870464899			
67	68.15169186195	7.04000000e-005			19.324796949683	0.0068891200781			
68	68.753282137259	0.0838202530148			19.324796949683	0.0068728585046			
69	69.280735280934	7.04000000e-005			19.547341207215	0.0067642842854			
70	70.764827247088	0.3480754707188			19.547341207215	0.006539874019			

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya Main Naval Base LAN									
Point Number	Time	1 - Solid Bl...	2 - Time	3 - GravPat...	4 - Time	5 - GravPat...	6 - Time	7 - GravPat...	8 - It GravPa...
70	70.20153747926	0.248747824885			19.547341207215	0.0065763874812			
71	71.968514285821	7.04000000e-005			20.113171953772	0.0066652726854			
72	73.005048185625	0.0040191333333			20.113171953772	0.0064851301619			
73	74.757112577468	7.04000000e-005			20.74488875572	0.0064870328646			
74	75.912397313602	0.0023896			20.74488875572	0.0063183214734			
75	77.778507947929	0.0053188106018			20.782566527094	0.013866262848			
76	78.64042555544	7.04000000e-005			20.782566527094	0.0135107239185			
77	80.683908460818	0.0023896			20.900294317506	0.0135125260467			
78	80.787883475797	0.0031998555557			20.900294317506	0.0131747158208			
79	81.445939281679	0.0040191333333			21.880142897911	0.0131784758208			
80	82.263270314998	0.011946468667			21.880142897911	0.012855093815			
81	82.105034885504	0.0023896			22.400583383628	0.0128568154347			
82	83.155946278637	7.04000000e-005			22.400583383628	0.0125607007815			
83	87.185563705564	0.0031998555557			22.755508937861	0.0127081482143			
84	88.238024813227	0.0023896			22.755508937861	0.0124212610808			
85	88.308214647633	0.0058446329448			22.755508937861	0.0124142480898			
86	88.403651071026	7.04000000e-005			22.755508937861	0.0121021080682			
87	91.471358212812	0.0023896			23.795029074028	0.0121337060682			
88	91.840992577823	7.04000000e-005			23.795029074028	0.0118640581596			
89	94.117406314802	2.8377073392846			25.472407033418	0.0118856328			
90	94.248724314802	0.0055050774846			25.472407033418	0.011607840853			
91	95.007796814802	0.007856215853			25.488770508604	0.0115082146			
92	95.063444857952	0.0040191333333			25.488770508604	0.0113622089352			
93	95.354046180489	7.04000000e-005			27.252177823631	0.0113630780895			
94	95.360527257941	0.0023896			27.252177823631	0.0111285638955			
95	97.772806847937	0.8507147060687			31.159696910214	0.0111284305625			
96	99.257038047937	0.78358939465			31.159696910214	0.0109013167347			
97	99.603369547937	0.812582177846			32.557921071403	0.010900870817			
98	99.851378828782	7.04000000e-005			32.557921071403	0.010731089304			
99	100	7.04000000e-005			33.213046486554	0.0107950826734			
100					33.213046486554	0.0105834143857			
101					35.563821157793	0.0105847947778			
102					35.563821157793	0.0103812419521			
103					36.10620235125	0.0104427768265			
104					36.10620235125	0.0102467404025			
105					39.799440889775	0.0100470137044			





Run 1, The 2<sup>nd</sup> LAN, Using Simulation Set Up 100, Mean 1 sec, T1 Line 1.544 Mbps

Point Number	Time	1: Solid Bl	2: Time	2: GrayPat	3: Time	3: GrayPat	4: Time	4: ItGrayPa
0	0.010999866667	0.010999866667			0.010999866667	0.010999866667		
1	0.033331666667	0.033331666667			0.033331666667	0.033331666667		
2	0.050468333333	0.050468333333			0.050468333333	0.050468333333		
3	0.0682695	0.0682695			0.0682695	0.0682695		
4	0.460722338067	0.29000000e-005			0.460722338067	0.29000000e-005		
5	0.6955034	0.0223596869028			0.6955034	0.0223596869028		
6	0.718890066667	0.0037107175835			0.718890066667	0.0037107175835		
7	1.2399643107529	0.29000000e-005			1.2399643107529	0.29000000e-005		
8	2.1075153232913	0.0410125333333			2.1075153232913	0.0410125333333		
9	2.1778923	0.0407342802607			2.1778923	0.0407342802607		
10	2.9942620333334	0.1210351064786			2.9942620333334	0.1210351064786		
11	3.2195477101118	0.29000000e-005			3.2195477101118	0.29000000e-005		
12	3.2524077652431	0.00489413533333			3.2524077652431	0.00489413533333		
13	3.5602101959759	0.29000000e-005			3.5602101959759	0.29000000e-005		
14	3.6854413966667	0.0941510122841			3.6854413966667	0.0941510122841		
15	4.4069523767251	0.29000000e-005			4.4069523767251	0.29000000e-005		
16	4.4682805	0.0445875907565			4.4682805	0.0445875907565		
17	5.007081736695	0.29000000e-005			5.007081736695	0.29000000e-005		
18	5.1765940333333	0.0093046952873			5.1765940333333	0.0093046952873		
19	5.5703671203747	0.29000000e-005			5.5703671203747	0.29000000e-005		
20	7.566651296665	0.071066662608			7.566651296665	0.071066662608		
21	8.291808205753	0.29000000e-005			8.291808205753	0.29000000e-005		
22	8.311615066665	0.0950943104633			8.311615066665	0.0950943104633		
23	8.4801416333332	0.0929095317285			8.4801416333332	0.0929095317285		
24	8.5291951814655	0.29000000e-005			8.5291951814655	0.29000000e-005		
25	10.3596903333333	0.0843059947456			10.3596903333333	0.0843059947456		
26	10.64096536665	0.29000000e-005			10.64096536665	0.29000000e-005		
27	11.474851286657	0.5975340768652			11.474851286657	0.5975340768652		
28	12.1614263187443	0.29000000e-005			12.1614263187443	0.29000000e-005		
29	12.2646428	0.0126200369758			12.2646428	0.0126200369758		
30	12.568861828795	0.29000000e-005			12.568861828795	0.29000000e-005		
31	12.861854826154	0.0063531033333			12.861854826154	0.0063531033333		
32	13.057527564282	0.29000000e-005			13.057527564282	0.29000000e-005		
33	13.3572645	0.0063212946639			13.3572645	0.0063212946639		
34	13.931585591587	0.29000000e-005			13.931585591587	0.29000000e-005		
35	14.555467536356	0.0048341333333			14.555467536356	0.0048341333333		

Run 1, Data Delay within the 2<sup>nd</sup> LAN

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FHq LAN									
Point Number	Time	1 Solid Bl	2 Time	3 GravPat	4 Time	5 GravPat	6 Time	7 GravPat	8 Time
35	14.862228158632	8.29000000e-005			4.706346388721	0.0270724217128			
37	15.175871223324	0.1584402301595			4.6882805	0.0293751522789			
39	15.500479833324	0.0104032168804			4.6882805	0.027907344455			
39	15.7742379	0.0545553404118			5.0070817285895	0.027911489455			
40	16.02519982887	0.0379618556667			5.0070817285895	0.0255823711095			
41	16.12120021543	8.29000000e-005			5.1083390254782	0.0255855187285			
42	16.495054492768	0.0238774216498			5.1083390254782	0.0253778469554			
43	16.644659553435	0.0357134809998			5.1765890333333	0.0258007903603			
44	18.42278612659	8.29000000e-005			5.1765890333333	0.0248790168951			
45	18.52979727090	0.046487505758			5.5703671203747	0.0246626212429			
46	18.833093271543	8.29000000e-005			5.5703671203747	0.0238541785911			
47	18.840545927891	0.0048341333333			6.0647342258744	0.0238576328578			
48	18.93225039378	0.1129375560564			6.0647342258744	0.0227113275439			
49	18.981581383554	8.29000000e-005			6.0379521395979	0.0227146454545			
50	19.985418087194	0.0048341333333			6.0379521395979	0.0218410034072			
51	19.975447677676	0.0062531333333			7.5585512868555	0.0245744148572			
52	20.231415460427	0.0121558575233			7.5585512868555	0.0238942511803			
53	20.69446389276	0.1156579254272			8.2919608205780	0.0234873211507			
54	21.487638079438	0.0062531333333			8.2919608205780	0.0229220803657			
55	22.251242693761	0.0001014613071			8.3115150856655	0.0282132854415			
56	22.412946255463	8.29000000e-005			8.3115150856655	0.0253142055331			
57	24.105516360428	0.4766304438448			8.4601416333333	0.0285179870376			
58	24.931291281879	8.29000000e-005			8.4601416333333	0.0275673874696			
59	26.176997805766	0.0048341333333			8.5291951614655	0.0275701530303			
60	26.412556490428	0.0099770323514			8.5291951614655	0.0258807910997			
61	26.645689317457	8.29000000e-005			9.0363958519294	0.0268834652932			
62	26.88042350428	0.5408554223871			9.0363958519294	0.0258496073028			
63	28.91083390771	8.29000000e-005			9.2688055345473	0.0256219757278			
64	27.07825493761	0.010147977581			9.2688055345473	0.0250637975297			
65	27.588229027098	0.3418832946875			9.462228145594	0.0260713088209			
66	27.90148893761	0.0137381447833			9.462228145594	0.0245339183556			
67	28.16339403951	0.0048341333333			10.3585903333333	0.0407546813069			
68	29.046225027095	0.3594883992487			10.3585903333333	0.0483331205382			
69	29.219463727095	8.30642699e-005			10.84099539935	0.0483354891098			
70	29.585192827095	0.25855648760161			10.84099539935	0.0456028285343			
71	29.849852421345	8.29000000e-005			10.65197922292	0.048951394121			

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FHq LAN									
Point Number	Time	1 Solid Bl	2 Time	3 GravPat	4 Time	5 GravPat	6 Time	7 GravPat	8 Time
72	29.864114105428	0.840574260541			10.65197922292	0.0467250005091			
73	30.686815892762	1.003689565159			11.470594701954	0.0467272410496			
74	31.254146308761	0.0063531333333			11.470594701954	0.0446236226009			
75	31.935914391276	8.29000000e-005			11.474851266657	0.0502484072553			
76	32.901418967359	0.0065887541228			11.474851266657	0.0507036539923			
77	32.71667360428	0.0138785831108			12.161476318744	0.0587057596334			
78	33.189446592762	0.0159157807954			12.161476318744	0.0572381448825			
79	33.891871322818	8.29000000e-005			12.2544326	0.0575536457944			
80	34.458935993762	0.8124653232197			12.2544326	0.058149898338			
81	34.80194327338	8.29000000e-005			12.585561808705	0.0581519202872			
82	34.805227791335	0.0079818568657			12.585561808705	0.0548140899042			
83	34.76470927095	1.408555046622			12.844580523885	0.0548169439137			
84	34.975540336723	8.29000000e-005			12.844580523885	0.0535421309715			
85	35.263989027095	0.3055418209563			12.851854806154	0.0536987825594			
86	36.150653460429	0.0092523055284			12.851854806154	0.0524695537525			
87	36.23814302513	8.29000000e-005			13.057527554282	0.0524715378434			
88	36.27189650429	1.6113494013043			13.057527554282	0.051305036661			
89	37.009515260426	0.0083410637147			13.3877605	0.0514693100018			
90	38.154699311158	8.29000000e-005			13.3877605	0.0503408263485			
91	38.80004554655	0.0048341333333			13.931585591987	0.0503424315235			
92	39.311284921195	8.29000000e-005			13.931585591987	0.0492713159591			
93	39.565909138794	0.1255585338028			14.003551212697	0.0492730797896			
94	40.154843734404	8.29000000e-005			14.003551212697	0.0482465572933			
95	41.338863393762	0.56847248282			14.555467538386	0.0482472894044			
96	41.79900080429	0.5430468543527			14.555467538386	0.0473635894674			
97	42.895054651093	8.29000000e-005			14.563228158632	0.0473622812941			
98	43.584820589429	0.0037950557046			14.563228158632	0.0464150358632			
99	43.607432129431	0.0031998865557			14.9038082965628	0.0464168936632			
100	43.679382327095	0.1265746363779			14.9038082965628	0.0450585524189			
101	43.942366527095	0.0188711679469			15.1736712203334	0.0458093120308			
102	44.00344371417	8.29000000e-005			15.1736712203334	0.0478706714148			
103	44.128118010121	0.0048341333333			15.5034798333334	0.0480708294279			
104	44.227402360428	0.1186975681092			15.5034798333334	0.0471638225483			
105	44.778405227096	0.2405741514603			15.7742379	0.0482820486153			
106	44.924638932776	0.0040101333333			15.7742379	0.0474850827591			
107	45.265517027095	0.006073064601			16.02519982887	0.0476336247654			

Extend									
File Edit Library Model Text Define Run Window Help									
[271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl	2: Time	2: GravPat	3: Time	3: GravPat	4: Time	4: GravPat	
108	45.333315121759	0.00796185555697			16.025199892387	0.0467674656787			
109	45.365544560429	0.1432222027328			16.12129021342	0.0467689794515			
110	47.04189253272	0.29000000e-005			16.12129021342	0.0468338078095			
111	47.805020480429	0.0105024485572			16.465054492758	0.0465586189104			
112	47.810482218016	0.29000000e-005			16.465054492758	0.0465403446844			
113	48.044916927098	0.0083381082908			16.544659595435	0.0468435592112			
114	48.212532276494	0.29000000e-005			16.544659595435	0.0468557093979			
115	48.382282127098	0.0310851414601			16.4227885369	0.0468531387093			
116	48.189905914281	0.0146929670178			16.4227885369	0.046978312726			
117	49.374452993055	0.29000000e-005			16.529797227093	0.046835750794			
118	49.741973314281	0.0098146773412			16.529797227093	0.0461778508475			
119	49.808185845801	0.29000000e-005			16.823093271943	0.0441090425141			
120	50.065295980948	0.1234502905728			16.823093271943	0.0441546185353			
121	51.109469535177	0.29000000e-005			16.840969327801	0.043464667407			
122	51.281821583048	0.1968247838792			16.840969327801	0.0427931722255			
123	51.502771714281	0.1080178035488			16.93325039378	0.0448147469718			
124	51.583401580948	0.2025772869415			16.93325039378	0.0439066754006			
125	51.662193114281	0.0882417798109			16.981801382354	0.0439078912736			
126	51.744171504801	0.29000000e-005			16.981801382354	0.0432218304725			
127	51.790680714281	0.0181135381951			16.97732335342	0.043223125785			
128	51.89580247815	0.5089116022581			16.97732335342	0.04258154619			
129	52.269341580948	0.2273463882388			19.643259093352	0.0425694300037			
130	52.280333114281	0.223999305546			19.643259093352	0.0419146901551			
131	52.585505149839	0.29000000e-005			19.685418087194	0.0419875049598			
132	52.983128347815	0.0065289269285			19.685418087194	0.0413811505011			
133	53.141016380948	0.3403746278436			19.875447877978	0.0414658733866			
134	53.424091814281	0.48289505e-005			19.875447877978	0.0408403267192			
135	53.782846349426	0.0047444			20.231416460427	0.0410250883298			
136	53.92586570892	0.29000000e-005			20.231416460427	0.0404305228178			
137	54.680823114281	0.1199410581553			20.69448239378	0.0421087246356			
138	54.867327364018	0.29000000e-005			20.69448239378	0.0415051999979			
139	55.545082095653	0.00798185555697			21.4878326079438	0.0415959580466			
140	55.57574569729	0.29000000e-005			21.4878326079438	0.0410101004674			
141	55.832188247815	0.1878317054438			22.251242683761	0.0410115262591			
142	55.958920303712	0.29000000e-005			22.251242683761	0.0404418247847			
143	57.387815447815	0.2922520224345			22.410956205463	0.0404430761736			

Extend									
File Edit Library Model Text Define Run Window Help									
[271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl	2: Time	2: GravPat	3: Time	3: GravPat	4: Time	4: GravPat	
144	57.516949780948	0.2923655961135			22.410956205463	0.0398990614314			
145	57.874024248253	0.007378757236			22.419894431811	0.0398910704979			
146	58.264654791378	0.29000000e-005			22.419894431811	0.03951140331			
147	60.301923114281	0.445675934746			22.847084133718	0.0393222805013			
148	60.407580535119	0.29000000e-005			22.847084133718	0.0389275637933			
149	60.418443114281	0.4414747873671			23.984834017998	0.0389286891266			
150	60.861592714281	0.012014320929			23.984834017998	0.0383177655895			
151	61.247339514281	0.5184730548004			24.108516380428	0.044689218794			
152	61.757531047815	0.0119846789946			24.108516380428	0.0440101380304			
153	61.95607485983	0.29000000e-005			24.931291381879	0.0440112148538			
154	62.452791404832	0.007408260408			24.931291381879	0.0434449893121			
155	62.502881535741	0.29000000e-005			25.733635531158	0.0434480311326			
156	63.054823847815	1.0825602540211			25.733635531158	0.0428980560540			
157	63.195520114281	0.0203995403453			25.770712507546	0.042899105422			
158	63.515260114281	0.0108727391308			25.770712507546	0.0423628686043			
159	63.591077013836	0.00798185555697			26.176997805786	0.042323932709			
160	64.173728263538	0.29000000e-005			26.176997805786	0.0418995483085			
161	64.351118447815	0.0059222093281			26.412556460428	0.042022369082			
162	64.955694382305	0.29000000e-005			26.412556460428	0.0415104838296			
163	65.594828280940	0.8347787874026			26.545898317467	0.0415115048052			
164	65.769228214281	0.2755073588765			26.545898317467	0.0410113861821			
165	65.825778153818	0.29000000e-005			26.890842380428	0.048737206787			
166	66.211074714281	0.011396235795			26.890842380428	0.0481535573382			
167	66.40733875534	0.29000000e-005			26.91083390771	0.048154544243			
168	66.50084414283	0.0101211815822			26.91083390771	0.0475883201931			
169	66.52284878587	0.0048241323233			27.271525901632	0.047588996872			
170	66.514714945418	0.29000000e-005			27.271525901632	0.0470350350746			
171	66.930597047818	0.0135670252417			27.397805480781	0.0471536347694			
172	67.36123885895	0.29000000e-005			27.397805480781	0.0468118389675			
173	67.835873814592	0.0755293439461			27.588223027095	0.05052404812191			
174	68.83128846355	0.29000000e-005			27.588223027095	0.0469831949404			
175	69.187857847826	0.1138001653182			27.991408093781	0.0501242502218			
176	69.384570963057	0.0100576480468			27.991408093781	0.0485610563591			
177	69.659217247826	0.1072686174684			28.188293408951	0.048615372504			
178	70.476588314693	0.020218858547			28.188293408951	0.0480640805873			
179	70.718261110058	0.29000000e-005			29.046229027095	0.05305841259			

Extend

File Edit Library Model Text Define Run Window Help

[1271] The Indonesian Eastern FHq LAN

Point Number	Time	1: Solid Bl...	2: Time	2: GravPat...	3: Time	3: GravPat...	4: Time	4: GravPa...
180	71.009775514593	0.0056070161935			29.046229027095	0.0524755522099		
181	71.115890882724	0.29030000e-005			29.210460727095	0.0524755522099		
182	71.22200798126	0.0363025460327			29.210460727095	0.0519056718084		
183	71.82229798126	0.2472255872728			29.565192327095	0.0547182508955		
184	72.052929714694	0.2066035144059			29.565192327095	0.0541279041117		
185	72.299628414694	0.0105151918728			29.549262421346	0.0541287955095		
186	72.551564555773	0.29030000e-005			29.549262421346	0.0525522572594		
187	72.552818934015	0.0079615665587			29.584114163428	0.0524652253327		
188	74.057028181261	0.2919925096928			29.584114163428	0.0513070923414		
189	74.607770552681	0.29030000e-005			30.593915993782	0.0724026402958		
190	75.584714547928	0.0301256794629			30.593915993782	0.0716489446126		
191	76.158224847929	1.302222376599			31.234146208761	0.0717146245682		
192	76.164973461986	0.29030000e-005			31.234146208761	0.0708752985714		
193	76.372111347929	0.0156105026793			31.905914291276	0.0709761552106		
194	76.569842820756	0.29030000e-005			31.905914291276	0.0702519367483		
195	76.606080592222	0.0048041333333			31.957984607357	0.0702527526677		
196	76.952655547929	0.01246214921885			31.957984607357	0.0685401289033		
197	76.969483105713	0.29030000e-005			32.001418987259	0.0685097828654		
198	77.270956847929	1.1578555707484			32.001418987259	0.0688128631555		
199	77.467353714341	0.29030000e-005			32.718637060428	0.0690904709865		
200	77.585803514593	0.0109571587703			32.718637060428	0.0693897732541		
201	77.89000315422	0.29030000e-005			33.189446553762	0.0695275554412		
202	78.081999253411	0.0063531333333			33.189446553762	0.0678555185241		
203	78.511851514593	0.0067250999095			33.891871822618	0.0678555185241		
204	78.930455223811	0.29030000e-005			33.891871822618	0.0671975319356		
205	79.565056381262	0.4555580462244			34.466935653762	0.0705085467407		
206	79.84119124793	0.460759941051			34.466935653762	0.0743034818527		
207	80.037505802471	0.29030000e-005			34.601943327336	0.0743034818527		
208	80.449590355924	0.0079615665587			34.601943327336	0.0738590477398		
209	80.563900093157	0.010702211201			34.608227791235	0.0737318750414		
210	80.710703047795	0.9047204685323			34.608227791235	0.0730382913146		
211	80.761460231118	0.29030000e-005			34.764709027095	0.0693256279615		
212	81.940188181262	0.4642001955527			34.764709027095	0.0655198158722		
213	81.597521814697	0.930430884409			34.978540356720	0.065519814388		
214	81.748325847931	0.8992931315064			34.978540356720	0.0647277433697		
215	82.137432467456	0.0048341333333			34.992796118237	0.0647235109623		

Extend

File

Edit

Library

Model

Text

Define

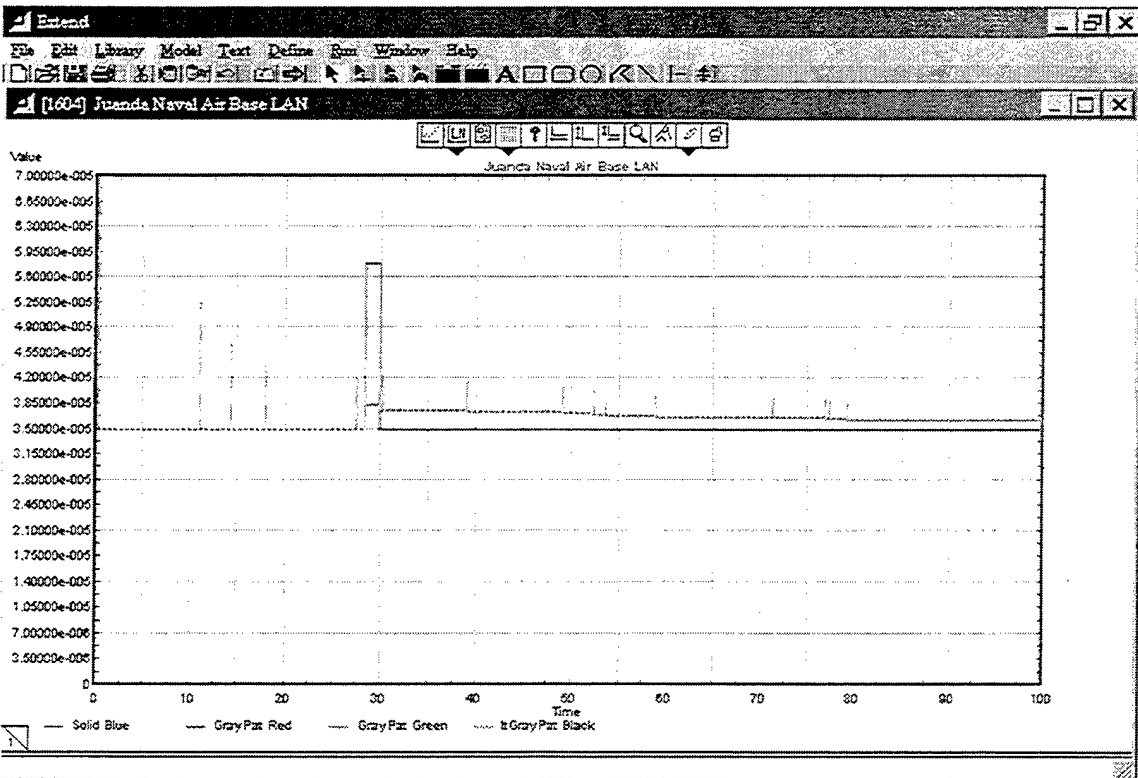
Run

Window

Help

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Extend							
File Edit Library Model Text Define Run Window Help							
[171] The Indonesian Eastern FHq LAN							
Point Number	Time	1: Solid Bl...	2: Time	2: GrayPat...	3: Time	3: GrayPat...	4: Time
251	57.278318047937	0.0078228087334			43.807432122431	0.0972184528707	
252	57.554283414603	0.0308800744057			43.807432122431	0.0984529532418	
253	98.001588714604	0.2222298004644			43.878392927096	0.0974488043154	
254	98.059217743482	8.29000000e-005			43.878392927096	0.0986882792816	
255	98.348348247937	0.0060881566147			43.942366827096	0.0983041477812	
256	98.454023047937	0.8072636751208			43.942366827096	0.0980834854726	
257	98.482091247937	0.8077248251565			44.003443871417	0.0980841381085	
258	98.730943047937	1.8213790895405			44.003443871417	0.0953450293538	
259	98.856550181271	0.8238538445844			44.198118010131	0.0953822148046	
260	98.98101170703	8.29000000e-005			44.198118010131	0.0946541064834	
261	190	8.29000000e-005			44.227402380429	0.095555815337	
262					44.227402380429	0.0948317061802	
263					44.778405227096	0.0988542408108	
264					44.778405227096	0.0989275160972	
265					44.924588932278	0.098957663757	
266					44.924588932278	0.0952415883729	
267					45.285517027096	0.0953888925407	
268					45.285517027096	0.0948310637071	
269					45.333315121759	0.0948400404672	
270					45.333315121759	0.0939441578468	
271					46.388594680429	0.094967269313	
272					46.388594680429	0.094303858904	
273					47.04189253272	0.0943044640135	
274					47.04189253272	0.0938210983323	
275					47.061784813074	0.0938216990588	
276					47.061784813074	0.0920481818536	
277					47.509020460429	0.0930237188393	
278					47.509020460429	0.0923592637037	
279					47.810462218016	0.0923596584886	
280					47.810462218016	0.091704821408	
281					48.040616927096	0.091767503027	
282					48.040616927096	0.0911212530057	
283					48.212532276404	0.0911212530085	
284					48.212532276404	0.0904948211685	
285					48.382322127096	0.0907020087711	
286					48.382322127096	0.0900721317241	



Run 1, The 3<sup>rd</sup> LAN

Extend

File

Edit

Library

Model

Text

Define

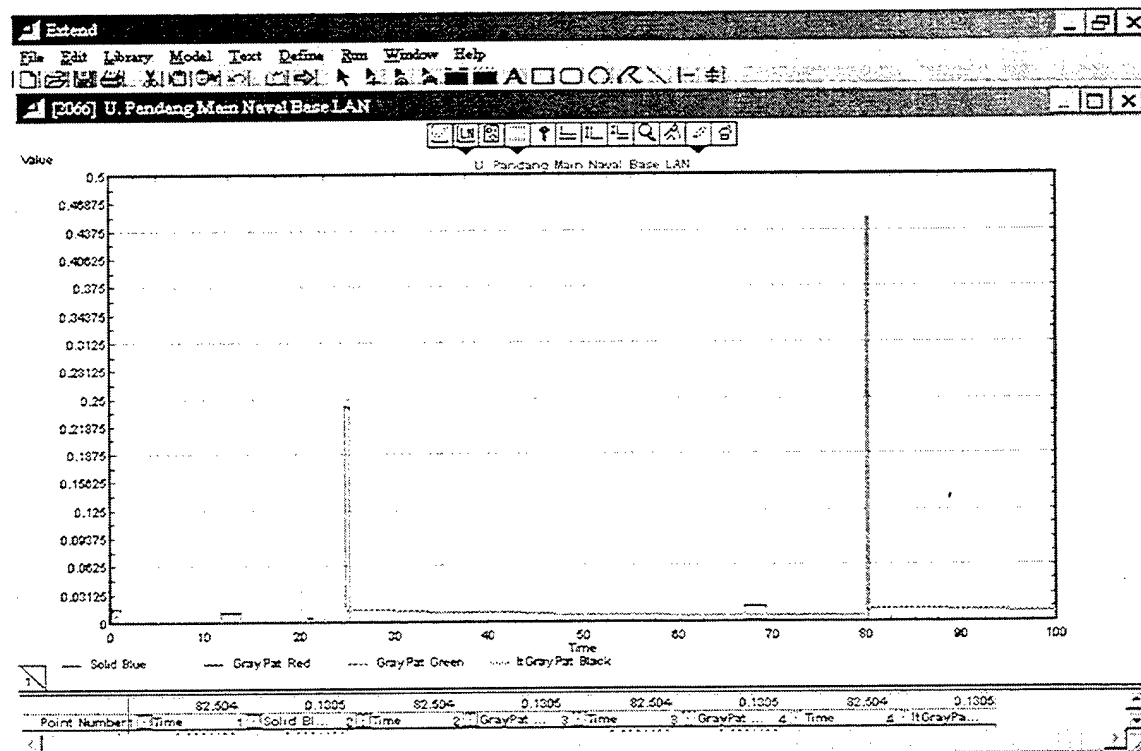
Run

Window

Help

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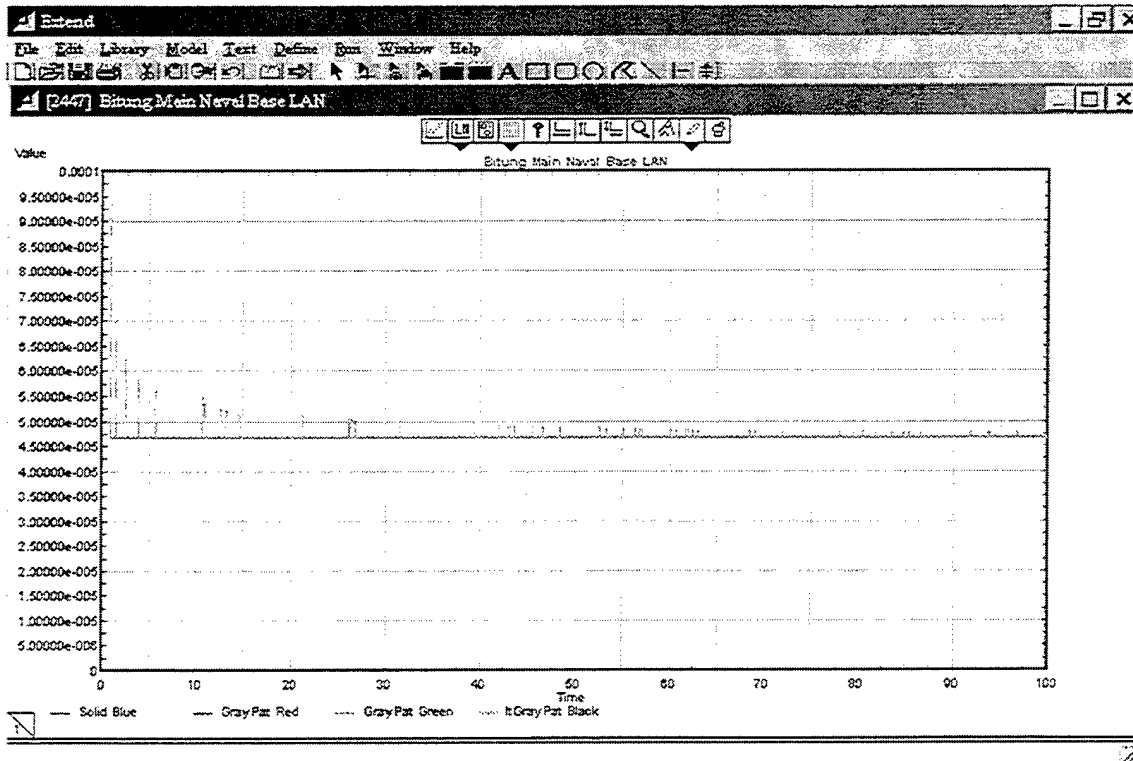
Run 1, Data Delay within the 3rd LAN



Run 1, The 4<sup>th</sup> LAN

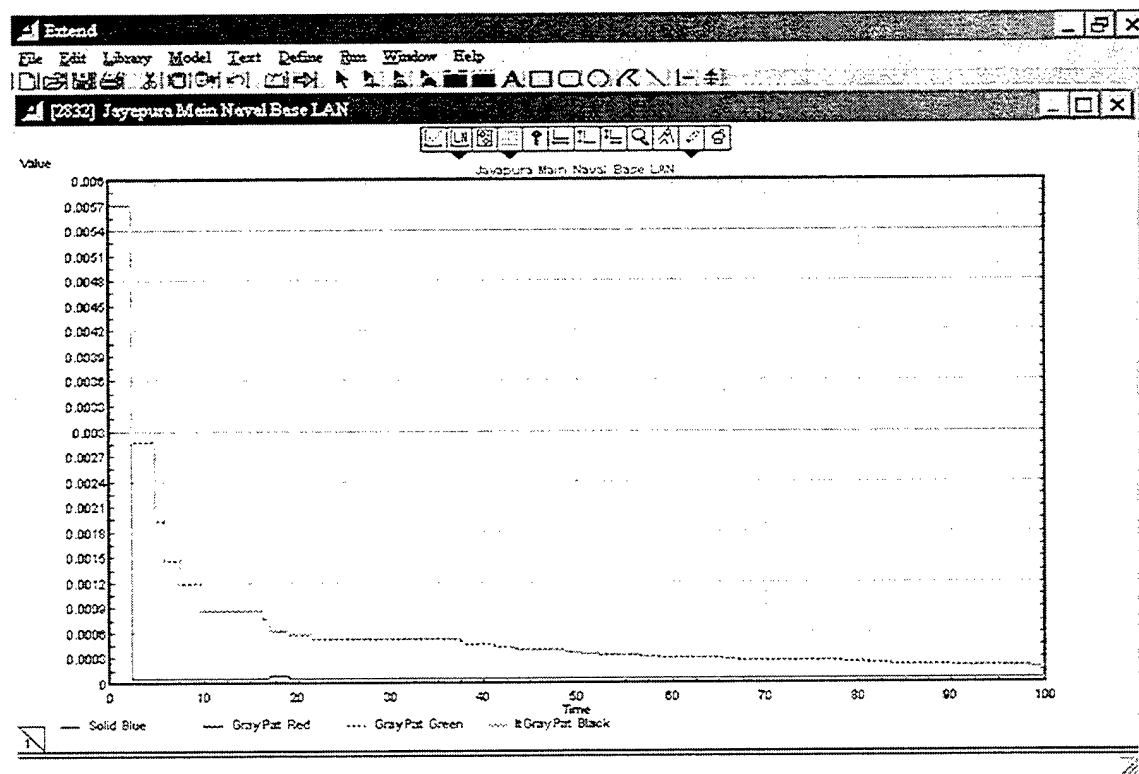
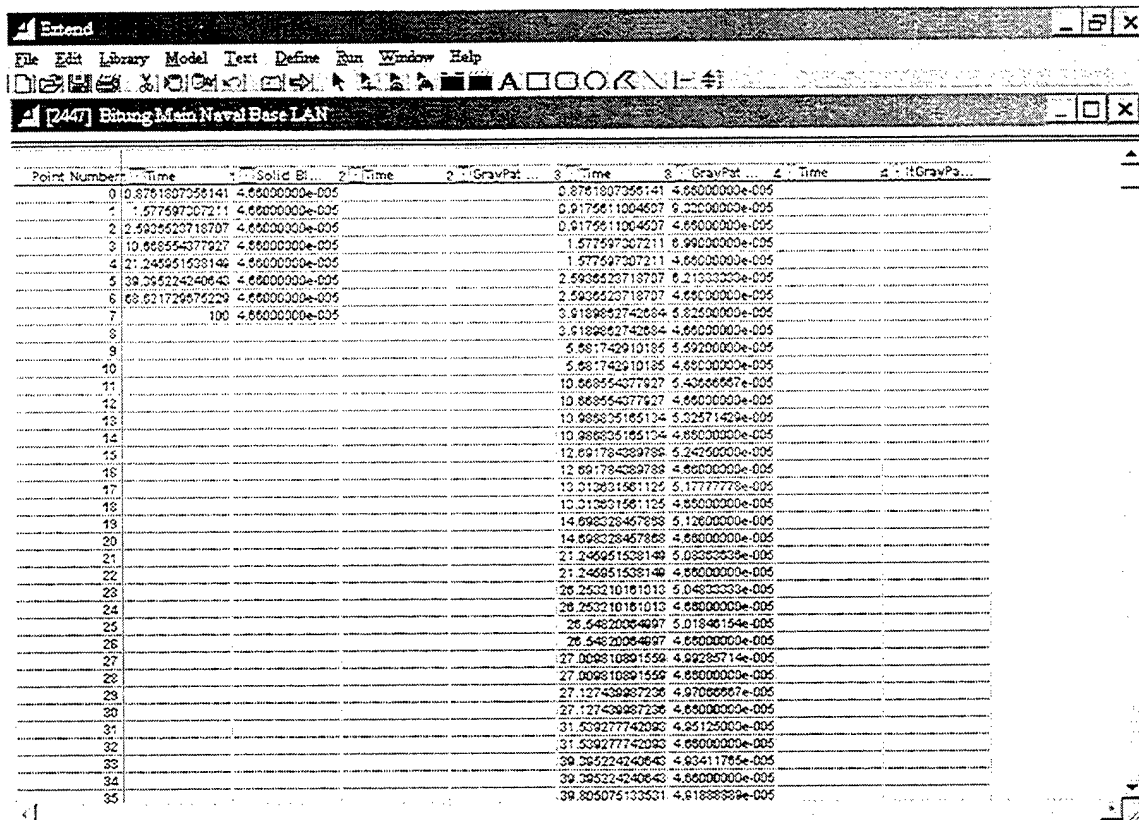
Point Number	Time	1: Solid Bl	2: Time	2: GrayPat	3: Time	3: GrayPat	4: Time	4: ItGrayPa
0	0.0001168	0.0001168			0.0001168	0.0001168		
1	0.0142208	0.0142208			0.0142208	0.0142208		
2	1.0540827115875	5.84000000e-005			1.0540827115875	0.0071688		
3	5.1751712673911	5.84000000e-005			5.1751712673911	0.0071688		
4	11.735789033333	0.0103107375793			11.735789033333	0.004798888888		
5	13.729537760002	5.84000000e-005			13.729537760002	0.0048181333333		
6	18.971724580427	0.0001102852575			18.971724580427	0.0035136		
7	20.762152727094	0.0043017723902			20.762152727094	0.0026282		
8	21.328072185646	5.84000000e-005			21.328072185646	0.00290256		
9	24.789582360428	0.2398915408747			24.789582360428	0.00291424		
10	25.17872185766	5.84000000e-005			25.17872185766	0.002426533333		
11	29.990586963428	0.0001155802738			29.990586963428	0.0024362566667		
12	32.870491278708	5.84000000e-005			32.870491278708	0.0020899428571		
13	63.217226547815	9.75190591e-005			63.217226547815	0.0020982857143		
14	65.971744514382	0.0186791327798			65.971744514382	0.0018308		
15	68.23146728498	5.84000000e-005			68.23146728498	0.0018433		
16	78.95304304793	0.4005871863274			78.95304304793	0.0016394588888		
17	80.224682310807	5.84000000e-005			80.224682310807	0.0016446777778		
18	100	5.84000000e-005			100	0.00148048		
19					8.7532517228405	0.00148632		
20					8.7532517228405	0.0013512		
21					8.5271051824801	0.0013585080808		
22					8.5271051824801	0.0012404556667		
23					11.735789033333	0.0021026947983		
24					11.735789033333	0.0019409460448		
25					13.729537760002	0.0019454413523		
26					13.729537760002	0.0018064812557		
27					17.877810493174	0.0018106528842		
28					17.877810493174	0.001689425053		
29					18.971724580427	0.0016974048558		
30					18.971724580427	0.0015914014273		
31					20.762152727094	0.0015802522017		
32					20.762152727094	0.0017508350134		
33					21.328072185646	0.0017542703075		
34					21.328072185646	0.0016568188468		
35					21.445712955006	0.0015600552004		

Run 1, Data Delay within the 4<sup>th</sup> LAN



Run 1, The 5<sup>th</sup> LAN

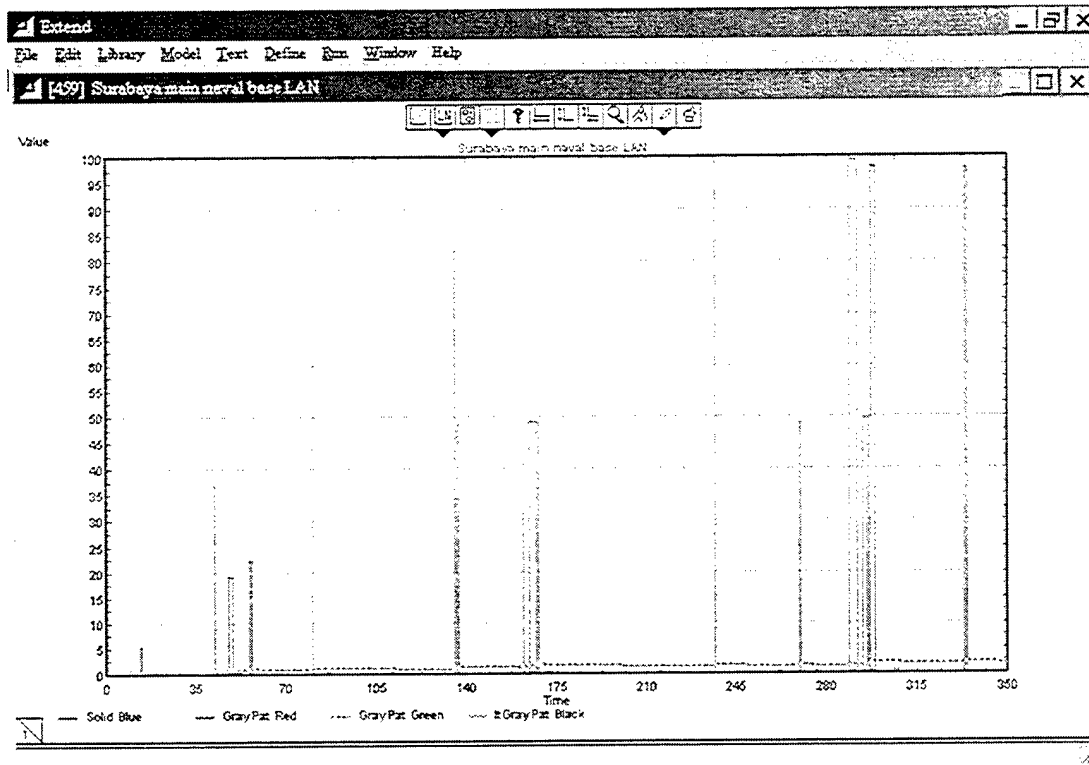






Extend							
File Edit Library Model Text Define Run Window Help							
[2002] Jagapura Main Naval Base LAN							
Point Number	1: Time	1: Solid Bl	2: Time	2: GravPat	3: Time	3: GravPat	4: Time
0	0.0056924666667	0.0056924666667	0.0056924666667	0.0056924666667	0.0056924666667	0.0056924666667	0.0056924666667
1	2.3833681212768	4.86000000e-005	2.3833681212768	0.0057396666667	2.3833681212768	0.0057396666667	2.3833681212768
2	9.7261782724133	4.86000000e-005	9.7261782724133	0.0028695333333	9.7261782724133	0.0028695333333	9.7261782724133
3	16.361665458322	4.86000000e-005	16.361665458322	4.9521946313422	16.361665458322	4.9521946313422	16.361665458322
4	17.043733926101	7.77948031e-005	17.043733926101	0.0019265555556	17.043733926101	0.0019265555556	17.043733926101
5	19.058595433286	4.86000000e-005	19.058595433286	5.9317481450357	19.058595433286	5.9317481450357	19.058595433286
6	37.426307402788	4.86000000e-005	37.426307402788	5.4817481420357	37.426307402788	5.4817481420357	37.426307402788
7	65.365255833805	4.86000000e-005	65.365255833805	7.6559920977468	65.365255833805	7.6559920977468	65.365255833805
8	100	4.86000000e-005	100	7.6559920977468	100	7.6559920977468	100
9				9.7261782724133	9.7261782724133	9.7261782724133	9.7261782724133
10				9.7261782724133	9.7261782724133	9.7261782724133	9.7261782724133
11				9.7541463811804	9.7541463811804	9.7541463811804	9.7541463811804
12				9.7541463811804	9.7541463811804	9.7541463811804	9.7541463811804
13				16.361665458322	16.361665458322	16.361665458322	16.361665458322
14				16.361665458322	16.361665458322	16.361665458322	16.361665458322
15				16.854670480544	16.854670480544	16.854670480544	16.854670480544
16				16.854670480544	16.854670480544	16.854670480544	16.854670480544
17				17.043733926101	17.043733926101	17.043733926101	17.043733926101
18				17.043733926101	17.043733926101	17.043733926101	17.043733926101
19				19.058595433286	19.058595433286	19.058595433286	19.058595433286
20				19.058595433286	19.058595433286	19.058595433286	19.058595433286
21				21.447559380012	21.447559380012	21.447559380012	21.447559380012
22				21.447559380012	21.447559380012	21.447559380012	21.447559380012
23				37.426307402788	37.426307402788	37.426307402788	37.426307402788
24				37.426307402788	37.426307402788	37.426307402788	37.426307402788
25				37.995837040265	37.995837040265	37.995837040265	37.995837040265
26				37.995837040265	37.995837040265	37.995837040265	37.995837040265
27				41.228597462469	41.228597462469	41.228597462469	41.228597462469
28				41.228597462469	41.228597462469	41.228597462469	41.228597462469
29				43.326354388403	43.326354388403	43.326354388403	43.326354388403
30				43.326354388403	43.326354388403	43.326354388403	43.326354388403
31				43.598040778526	43.598040778526	43.598040778526	43.598040778526
32				43.598040778526	43.598040778526	43.598040778526	43.598040778526
33				48.726100269951	48.726100269951	48.726100269951	48.726100269951
34				48.726100269951	48.726100269951	48.726100269951	48.726100269951
35				50.87761118749	50.87761118749	50.87761118749	50.87761118749

Run 1, Data Delay within the 6<sup>th</sup> LAN



Run 2, The 1<sup>st</sup> LAN, Using Simulation Set Up 350, Mean 1 sec, ISDN 128 Kbps

Point Number	Time	1 - Solid Blue	2 - Time	2 - GrayPat Red	3 - Time	3 - GrayPat Green	4 - Time	4 - It GrayPat Black
0	0.584311104499	7.04000000e-005			0.584311104499	7.04000000e-005		
1	2.8940893108253	7.04000000e-005			1.5470748748228	0.0001403		
2	4.0571527091056	0.0403812398018			1.5470748748228	7.04000000e-005		
3	4.9832782398354	7.04000000e-005			2.8940893108253	0.0001056		
4	5.938948107818	0.03549946			2.8940893108253	7.04000000e-005		
5	8.1777894467639	7.04000000e-005			3.1085481752017	0.38666667e-005		
6	10.618729605312	0.03646946			3.1085481752017	7.04000000e-005		
7	10.735325083075	7.04000000e-005			4.0571527091056	0.0081285579603		
8	13.34248355	5.1688812195318			4.9832782398354	0.0081426479603		
9	13.580380601458	0.0467418			4.9832782398354	0.0087855596669		
10	14.87038871399	7.04000000e-005			5.3803103825904	0.0067672733003		
11	15.424659464279	7.04000000e-005			5.3803103825904	0.008220342874		
12	18.546094673007	0.0527746516813			5.6746015648851	0.0058352914002		
13	19.722038465041	7.04000000e-005			5.6746015648851	0.0051067549752		
14	25.265620812749	0.0272571			6.5635848107818	0.0098591882252		
15	26.150613588188	7.04000000e-005			6.5635848107818	0.0085948322001		
16	26.426382075	0.0517655061102			8.1777894467639	0.0086025544224		
17	27.69010351415	7.04000000e-005			8.1777894467639	0.0077425898602		
18	28.025125811871	0.03646946			9.5018738157308	0.0077494298602		
19	28.95894741387	7.04000000e-005			9.5018738157308	0.0070446354394		
20	31.915117443271	0.0272571			10.516726905318	0.0103620872547		
21	33.142289763218	0.0467418			10.516726905318	0.0094994783185		
22	33.871712683438	0.0771819351248			10.735325083075	0.0065053446835		
23	35.777190195192	0.0272571			10.735325083075	0.0087741846001		
24	35.84679384316	7.04000000e-005			10.378855483791	0.0087796769847		
25	36.20751252944	0.03549946			10.378855483791	0.0081524671287		
26	37.369761525499	7.04000000e-005			11.868070001258	0.0081574957001		
27	38.001180338438	0.0539416887173			11.868070001258	0.0078138628534		
28	38.482598338258	7.04000000e-005			12.811903218778	0.0078195568858		
29	38.595247325	0.068006292552			12.811903218778	0.0071422087378		
30	38.85202093531	7.04000000e-005			13.34248355	0.3301847849683		
31	40.542756394839	0.0272571			13.34248355	0.310782150546		
32	41.326778338429	7.04000000e-005			13.580380601458	0.3134628446867		
33	41.567956134338	0.0919257902337			13.580380601458	0.2960387977407		
34	41.612108157284	7.04000000e-005			14.87038871399	0.2960427088519		
35	42.38018115	0.0781211927948			14.87038871399	0.2960427088519		
36	47.6798288775	39.1054807767458						

Run 2, Data Delay within the 1<sup>st</sup> LAN

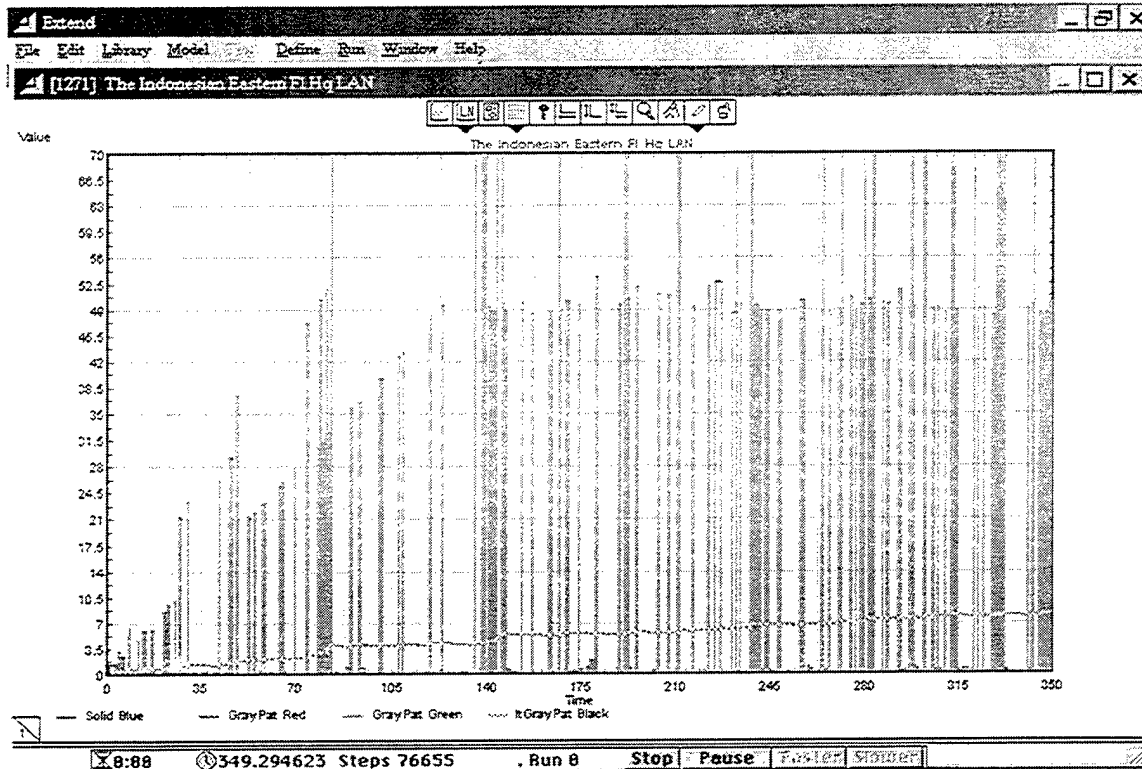
Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya main naval base LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GravPat ...	3: Time	3: GravPat ...	4: Time	4: GravPat ...	
37	42.551580462213	7.04000000e-005			18.424659464279	0.2804652189123			
38	45.969284772354	0.0652403979583			16.424659464279	0.2864419579657			
39	47.571911854011	7.04000000e-005			16.428376446851	0.2664454779657			
40	47.971963275	19.01883695088			16.428376446851	0.253757526835			
41	49.134371263438	0.118180363784			17.227342876277	0.2557605954444			
42	49.295555532721	0.048917897463			17.227342876277	0.3422263817879			
43	49.743264464275	0.03548846			18.548084573007	0.3460797688825			
44	50.3210544359	7.04000000e-005			18.548084573007	0.2344241265859			
45	50.463246883438	0.1952540093943			19.722038495041	0.2344271874354			
46	52.592346475	0.0749955465236			19.722038495041	0.2246523879593			
47	55.81425392104	7.04000000e-005			22.056154307986	0.2246623212923			
48	55.810339425	22.253619572595			22.056154307986	0.2156758284406			
49	55.469188639218	0.03649946			23.111258964377	0.2156758444406			
50	55.54554485707	7.04000000e-005			23.111258964377	0.2073333119621			
51	55.55302317146	0.0272571			23.294624246688	0.2073850195544			
52	57.16875859078	7.04000000e-005			23.294624246688	0.1987050556355			
53	58.713557575	0.054121935585			23.396238687227	0.1987076633706			
54	59.134059418058	7.04000000e-005			23.396238687227	0.192575248322			
55	62.981415213437	0.036231820415			25.290520812746	0.1935467146791			
56	64.241140282527	0.0272571			25.290520812746	0.1898746210995			
57	65.071771080444	7.04000000e-005			28.150613888188	0.1898746210995			
58	67.168697175	0.0697178727995			28.150613888188	0.1808478137005			
59	67.246987592287	7.04000000e-005			26.428362075	0.182373305708			
60	71.444027888073	0.088253483598			26.428362075	0.1764803196073			
61	71.894394513871	7.04000000e-005			27.89010351415	0.1764803196073			
62	74.412547838438	0.0579811777773			27.89010351415	0.170971974102			
63	74.428810106899	7.04000000e-005			28.022442900837	0.170971974102			
64	74.432755138438	0.0657188573582			28.022442900837	0.1827982035442			
65	75.038071128112	7.04000000e-005			28.025125611871	0.1869042474886			
66	77.881043038438	0.0718187463714			28.025125611871	0.1818952990331			
67	77.88207894704	7.04000000e-005			28.96894741387	0.1818952990331			
68	79.407688505879	0.0272571			28.96894741387	0.1573683734964			
69	80.165782739281	7.04000000e-005			29.047780842846	0.157370884775			
70	80.719975625	62.530587670051			29.047780842846	0.152699471309			
71	80.749139525	0.0908206743821			29.10758408156	0.1530014268648			
72	80.937935463882	7.04000000e-005			29.10758408156	0.148882531055			
73	87.67747493203	0.0777571			29.338678198821	0.148882531055			

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya main naval base LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GravPat ...	3: Time	3: GravPat ...	4: Time	4: GravPat ...	
73	82.92747493203	0.0272571			29.338678198821	0.148882531055			
74	83.239235472571	7.04000000e-005			29.338678198821	0.1449505728191			
75	84.163530355307	0.03548846			29.349318669719	0.1449524254607			
76	84.41387383888	7.04000000e-005			29.353318669719	0.1412356659229			
77	85.810748891484	0.2509746898298			30.477295023196	0.1412375017212			
78	87.540746755486	0.0272571			30.477295023196	0.1377085641781			
79	88.041987427184	7.04000000e-005			30.576318634857	0.1377083241781			
80	88.262892313022	0.0272571			30.576318634857	0.1343495846684			
81	88.821465433796	7.04000000e-005			30.80446732143	0.1343513016372			
82	89.514796344872	0.0753583295988			30.80446732143	0.1311152461122			
83	90.61353838439	0.0915034095821			31.354461019597	0.1311541373125			
84	91.465225712612	0.0272571			31.354461019597	0.1281040410959			
85	92.303355718529	7.04000000e-005			31.541972941942	0.1281058783052			
86	105.07227510555	0.03548846			31.541972941942	0.1251941858165			
87	107.47874623504	7.04000000e-005			31.915117443271	0.1258128551619			
88	110.18446314632	0.03548846			31.915117443271	0.1230178059351			
89	111.09646471458	7.04000000e-005			33.142289760218	0.1240342603806			
90	111.28789075	0.3482032805121			33.142289760218	0.1213378927639			
91	111.324279175	0.0577239737052			33.671719983438	0.1230157809185			
92	112.87863875253	7.04000000e-005			33.671719983438	0.1203994043072			
93	115.77292121611	0.0272571			35.777190105192	0.1209793426011			
94	113.93892471373	7.04000000e-005			35.777190105192	0.1184579804635			
95	116.06629164675	0.0272571			35.84679384316	0.1184594271302			
96	116.57325187509	7.04000000e-005			35.84679384316	0.118041887801			
97	118.22875103844	0.0537231727857			36.207512529444	0.1167887746357			
98	119.11526753822	0.0272571			36.207512529444	0.114451039046			
99	120.57967553439	7.04000000e-005			37.369761525499	0.114452447046			
100	121.41555455534	0.03548846			37.369761525499	0.1122082314187			
101	121.57933327596	7.04000000e-005			38.001180538438	0.1132659519876			
102	122.07558747582	0.0272571			38.001180538438	0.1110877700188			
103	122.82852699246	7.04000000e-005			38.48256838258	0.1110891258647			
104	134.2042339701	0.03548846			38.48256838258	0.1089931026593			
105	135.588796875	81.31089825578			38.48256838258	0.1089944308618			
106	135.89964163907	7.04000000e-005			38.48256838258	0.1069780155735			
107	138.83273355	48.494517737			39.585247325	0.108235446917			
108	137.29878207771	7.04000000e-005			39.585247325	0.1062675297003			
109	146.8417549498	0.03548846			39.857878198821	0.1076880877602			

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya main naval base LAN									
Point Number	Time	1 - Solid Bl...	2 - Time	3 - GravPat...	4 - Time	5 - GravPat...	6 - Time	7 - GravPat...	8 - Time
205	262.6113952446	0.0272571			69.323753597331	0.8073277607416			
209	262.5567539492	7.04000000e-005			69.303132117191	0.8073284312177			
210	266.39627894494	0.0272571			69.303132117191	0.7997121255232			
211	267.32362253426	7.04000000e-005			69.575086747825	0.7997127894139			
212	266.67326750632	0.0364694600001			69.575086747825	0.79232994909546			
213	270.08739561346	48.762147935709			70.067056520559	0.7949639461854			
214	270.49502018293	7.04000000e-005			70.73114678859	0.7849646970172			
215	271.21372037501	0.0279209345504			70.73114678859	0.7777936374116			
216	271.41096930287	7.04000000e-005			71.444027483072	0.7784947873829			
217	275.30532483946	0.1082952253109			71.444027483072	0.7714175520429			
218	276.40775168946	0.2258920527891			71.684394618871	0.7714182020429			
219	276.53210847505	7.04000000e-005			71.684394618871	0.764468488511			
220	280.13585761514	0.0364694600001			71.692878355874	0.7544691227452			
221	280.16022541346	0.0577594971015			71.692878355874	0.7575435055779			
222	281.72132672601	7.04000000e-005			74.412547538426	0.7514616265728			
223	281.82894779954	0.0364694600001			74.412547538426	0.7514616265728			
224	282.54032467812	7.04000000e-005			74.425810103899	0.7514622465786			
225	285.84722946002	59.141878934622			74.425810103899	0.7448353531793			
226	292.1285510207	7.04000000e-005			74.425759138426	0.7454370440387			
227	294.30628049995	0.0272571			74.425759138426	0.7389546831292			
228	294.33099317502	49.449646579008			75.638071126112	0.7389555953031			
229	296.77757540313	0.0364694600001			75.638071126112	0.7325585288447			
230	296.75546230002	46.52493616854			77.881040308438	0.7325585288447			
231	297.48646792502	67.963026368015			77.881040308438	0.7264391504806			
232	299.32281306823	7.04000000e-005			77.880207394704	0.7207786462053			
233	302.01216423846	0.0713495968311			78.329246580023	0.7147222773893			
234	302.41205271346	0.0534625178598			78.329246580023	0.7147222773893			
235	303.31419265485	7.04000000e-005			78.334112236908	0.7147223689599			
236	303.5114254737	0.0364694600001			78.334112236908	0.7087658460519			
237	304.63151488016	7.04000000e-005			79.369975081591	0.7087674317186			
238	304.82559317463	0.069309355903			79.369975081591	0.7028068496282			
239	305.87523206028	0.0719297063596			79.407688506879	0.7031351149275			
240	306.0594982158	0.0659610522858			79.407688506879	0.6973717123461			
241	307.39041223154	7.04000000e-005			80.165762759951	0.6973722893953			
242	308.22635366346	0.5472118775731			80.165762759951	0.6917079462856			
243	308.29101029589	7.04000000e-005							
244	310.88901733444	0.07390757347							

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya main naval base LAN									
Point Number	Time	1 - Solid Bl...	2 - Time	3 - GravPat...	4 - Time	5 - GravPat...	6 - Time	7 - GravPat...	8 - Time
245	310.92236700242	7.04000000e-005			80.554016811795	0.6917031863403			
246	310.93591541846	0.0364694600001			80.554016811795	0.6961246169857			
247	311.43816530304	0.0272571			80.719275825	1.1804038468571			
248	312.21481949293	0.0364694600001			80.719275825	1.1803896190592			
249	313.573620994	7.04000000e-005			80.747119325	1.1813655844533			
250	315.52115585524	0.0364694600001			80.747119325	1.1716996571164			
251	316.13546321346	0.1968814159433			80.937935463882	1.1719602258465			
252	316.32589549539	0.0364694600001			80.937935463882	1.1627619563517			
253	318.98829422251	7.04000000e-005			82.92747469903	1.1629765791883			
254	318.75129565025	0.0272571			82.92747469903	1.1538968246614			
255	318.98957579907	7.04000000e-005			83.239265472571	1.1538912746614			
256	319.58471308798	0.0272571			83.239265472571	1.1449404602842			
257	319.60306514493	7.04000000e-005			83.619367365172	1.1449407026206			
258	321.01670026346	0.0729625746726			83.619367365172	1.1281397412051			
259	321.54400925005	7.04000000e-005			83.301174519549	1.1361402827438			
260	321.75671425831	0.0663751968357			83.621174619549	1.1274674661577			
261	321.87680814588	7.04000000e-005			83.947463967076	1.1274674661577			
262	324.59157885884	0.0467418			83.947463967076	1.1189285693686			
263	324.55275274886	7.04000000e-005			84.163530355307	1.1192030803526			
264	329.48009379738	0.0364694600001			84.163530355307	1.1107880195990			
265	329.8334112158	7.04000000e-005			84.41387368086	1.1107885489223			
266	332.08158802055	0.0364694600001			84.41387368086	1.102490821393			
267	333.60996327502	97.719795341016			85.610748591494	1.1043720275858			
268	334.77891388546	0.1079406468761			85.610748591494	1.0961914040481			
269	335.47343549154	7.04000000e-005			87.540746735496	1.0983933884925			
270	337.57721371134	0.0364694600001			87.540746735496	1.0883316223271			
271	340.5736929787	7.04000000e-005			88.041937427184	1.0883321999742			
272	341.17332142502	0.099787584411			88.041937427184	1.0802881660175			
273	341.79793150956	7.04000000e-005			88.262892313522	1.0805871262518			
274	346.35336821738	0.0272571			88.262892313522	1.072597847572			
275	346.85923176057	7.04000000e-005			88.329736715884	1.0728407999746			
276	347.76051134648	0.0272571			88.329736715884	1.0652357042913			
277	348.96853304141	0.0364694600001			88.321465433798	1.0652357107661			
278	348.13673955418	7.04000000e-005			88.321465433798	1.0576258842507			
279	350	7.04000000e-005			89.514706344873	1.0581723009008			
280					89.514706344873	1.0506675328062			
281					89.611535948426	1.0513164031806			

Run 2, Data Delay within the 1<sup>st</sup> LAN



Run 2, the 2<sup>nd</sup> LAN, Using Simulation Set Up 350, Mean 1 sec, ISDN 128 Kbps

Point Number Time 1:Solid Bl... 2:GrayPat... 3:Time

0	0.164425885521	8.29000000e-005	0.164425885521	8.29000000e-005
1	0.165531425	0.165531425	0.165531425	0.165531425
2	0.4560258096119	8.29000000e-005	0.4560258096119	0.4560258096119
3	1.206797223647	1.206797223647	1.206797223647	1.206797223647
4	3.0509257273235	8.29000000e-005	3.0509257273235	8.29000000e-005
5	4.066937541208	8.29000000e-005	4.066937541208	8.29000000e-005
6	4.3226690591066	3.1049460920082	4.3226690591066	3.1049460920082
7	4.6753655264064	8.29000000e-005	4.6753655264064	8.29000000e-005
8	5.1039958777432	0.0551408	5.1039958777432	0.0551408
9	5.1443513619215	8.29000000e-005	5.1443513619215	8.29000000e-005
10	5.289581125	2.4183541921462	5.289581125	2.4183541921462
11	5.6254091485203	8.29000000e-005	5.6254091485203	8.29000000e-005
12	7.82969485	5.288085057096	7.82969485	5.288085057096
13	8.011341178283	8.29000000e-005	8.011341178283	8.29000000e-005
14	8.465606725	0.2976021803978	8.465606725	0.2976021803978
15	8.5852076004162	8.29000000e-005	8.5852076004162	8.29000000e-005
16	8.63036035	6.289339303411	8.63036035	6.289339303411
17	8.667774877034	8.29000000e-005	8.667774877034	8.29000000e-005
18	8.68537235	0.709454188024	8.68537235	0.709454188024
19	8.801741469354	8.29000000e-005	8.801741469354	8.29000000e-005
20	9.01537235	0.229294856098	9.01537235	0.229294856098
21	9.4841641310883	8.29000000e-005	9.4841641310883	8.29000000e-005
22	10.154858263588	0.0875615868593	10.154858263588	0.0875615868593
23	10.644836723395	8.29000000e-005	10.644836723395	8.29000000e-005
24	11.010719428412	0.0551408	11.010719428412	0.0551408
25	11.204200308353	8.29000000e-005	11.204200308353	8.29000000e-005
26	11.568299540586	0.254509362054	11.568299540586	0.254509362054
27	11.720362375	4.6575103400032	11.720362375	4.6575103400032
28	11.926244639438	0.2307653426837	11.926244639438	0.2307653426837
29	12.007807128438	0.1177098901244	12.007807128438	0.1177098901244
30	12.348236803613	8.29000000e-005	12.348236803613	8.29000000e-005
31	13.1029781	5.6285806302056	13.1029781	5.6285806302056
32	13.16375889463	8.29000000e-005	13.16375889463	8.29000000e-005
33	13.230591438438	5.7732053674874	13.230591438438	5.7732053674874
34	14.331090213428	0.0650532273656	14.331090213428	0.0650532273656
35	14.48369242834	8.29000000e-005	14.48369242834	8.29000000e-005
36	14.177117384067	0.1443556960751	14.177117384067	0.1443556960751

Run 2, Data Delay within the 2<sup>nd</sup> LAN

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FI Hq LAN									
Point Number	Time	1. Solid B...	2. Time	3. GravPa...	4. Time	5. GravPa...	6. Time	7. GravPa...	8. Time
37	15.32355322503	8.29030000e-005			8.5234031482203	0.2657901175158			
38	15.046504134007	8.29030000e-005			8.5234031482203	0.247500611184			
39	16.2178223	8.1062584672811			8.5121734615149	0.347504756954			
40	16.727151173993	8.29030000e-005			8.5121734615149	0.3309559110857			
41	21.4292203	8.4161609265446			7.0361320525408	0.3309559110857			
42	22.177224855767	8.29030000e-005			7.0361320525408	0.3159171833091			
43	22.753106533032	8.318105821960			7.059032583127	0.3159209514939			
44	22.256411583022	0.3294380925816			7.059032583127	0.3021852579478			
45	22.223599382033	0.394931855844			7.02994985	0.304446258478			
46	24.189552582741	8.29030000e-005			7.02994985	0.3140877495791			
47	24.294161388423	0.1007615005182			8.0113411182683	0.3141012037468			
48	24.391659444297	8.29030000e-005			8.0113411182683	0.4425371559959			
49	25.3551298	8.3197109312823			8.0429028072154	0.4905404715959			
50	25.401795794821	8.29030000e-005			8.0429028072154	0.4745531457655			
51	25.695730773	0.1475958677387			8.4063296539604	0.4745531457655			
52	26.448770783438	0.1388303517265			8.4063296539604	0.4563945885148			
53	26.462484515878	8.29030000e-005			8.455555725	0.4683072817143			
54	27.253277276035	21.21885003196			8.455555725	0.4512627450317			
55	27.445488322453	8.29030000e-005			8.5832226004182	0.4512657862855			
56	27.854185189438	0.1542771197019			8.5832226004182	0.450737853692			
57	28.21246158259	8.29030000e-005			8.53325035	0.5525248174698			
58	30.022292225	23.325509073421			8.53325035	0.6307739902209			
59	30.074929225	11.811148595467			8.567774877024	0.6307739902209			
60	30.298158507592	8.29030000e-005			8.567774877024	0.6104291163428			
61	32.347196592021	8.29030000e-005			8.58327235	0.6303147352488			
62	32.578716438438	0.1263374091056			8.58327235	0.6135226467734			
63	33.46888105394	8.29030000e-005			8.801741462264	0.5135257403854			
64	35.285294583438	0.1869075151546			8.801741462264	0.59464538141			
65	37.304650163438	0.4183289703782			9.01537235	0.6018825851137			
66	37.7222231	0.1218363318477			9.01537235	0.5841804279044			
67	37.7960356	0.1706421026279			9.4641641310882	0.5841828581397			
68	37.90597292178	8.29030000e-005			9.4641641310882	0.5674619271072			
69	39.5925981	0.187081826814			10.134659293589	0.5599938861603			
70	39.844079403512	8.29030000e-005			10.134659293589	0.5541805282114			
71	40.297908975	0.0627128034226			10.544886723399	0.5541828308892			
72	40.57831827728	8.29030000e-005			10.544886723399	0.5291854671787			
73	40.88931098426	0.170442478854			10.890677889368	0.5291876977197			

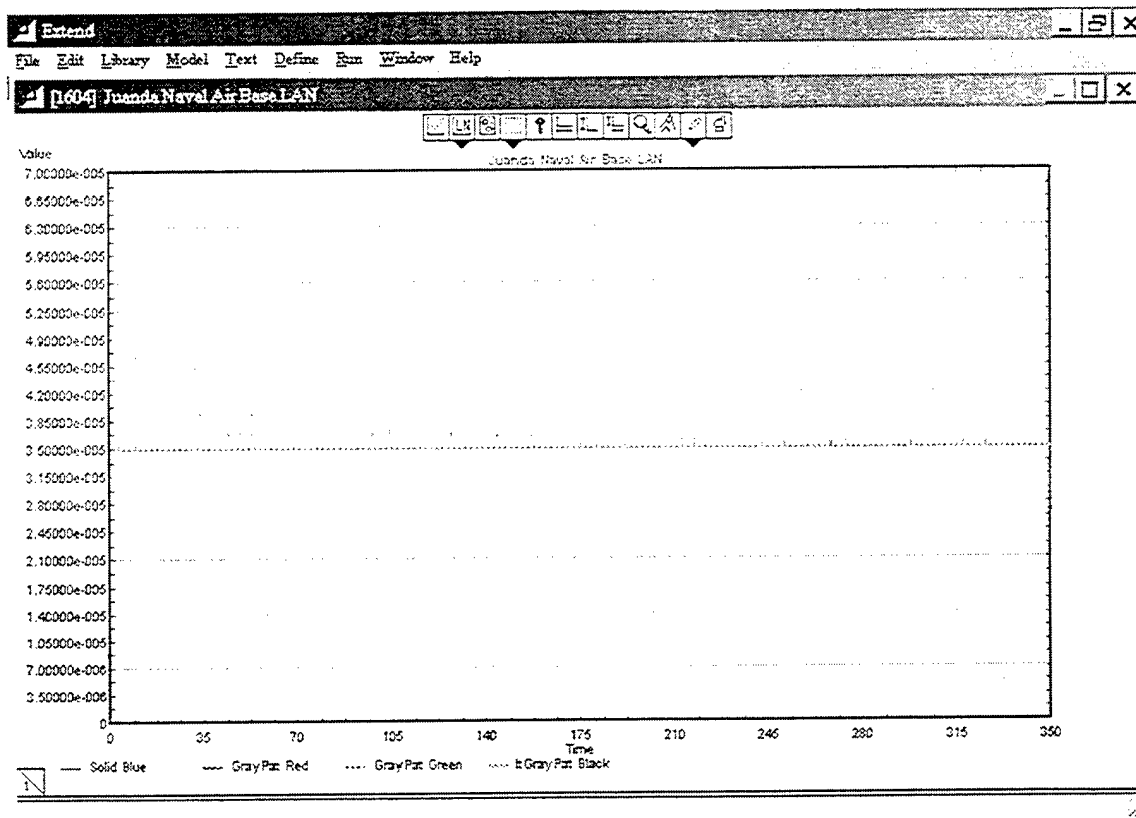
Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FI Hq LAN									
Point Number	Time	1. Solid B...	2. Time	3. GravPa...	4. Time	5. GravPa...	6. Time	7. GravPa...	8. Time
74	40.859783315604	8.29030000e-005			10.85997388359	0.5249935477792			
75	41.115548257446	0.0551408			11.010719428412	0.5264466214634			
76	41.207751555793	8.29030000e-005			11.010719428412	0.5129509132208			
77	41.65499505	16.538246503276			11.204205038353	0.5129530388918			
78	41.72779605	26.08184355589			11.204205038353	0.5001292128903			
79	41.759442199429	8.29030000e-005			11.593299543586	0.5064639852654			
80	43.047027713438	0.0883493757236			11.593299543586	0.4941404744345			
81	43.968591898853	8.29030000e-005			11.720362375	0.6077382876053			
82	44.048922612583	0.2058277092399			11.720362375	0.5932683283786			
83	44.326993666236	8.29030000e-005			11.925244638438	0.598049493623			
84	46.507272974	18.142730135234			11.925244638438	0.584140375221			
85	46.60008797264	0.4253302467107			12.007807138438	0.5888778145262			
86	46.834263925	29.050427451665			12.007807138438	0.5735996323779			
87	46.817469427762	8.29030000e-005			12.348836802813	0.5735415664688			
88	47.850657563438	0.0506137153262			12.348836802813	0.5607901983251			
89	48.08030442883	8.29030000e-005			13.1029781	0.6555313212185			
90	48.104592925	37.346406244822			13.1029781	0.6709218448703			
91	48.994070123342	8.29030000e-005			13.16375989453	0.6709237468442			
92	52.522354725	21.25142808816			13.16375989453	0.6585487735071			
93	52.88218355583	8.29030000e-005			13.230521438438	0.778478874843			
94	54.43810855	21.842317825656			13.230521438438	0.7632395358917			
95	55.08544218542	8.29030000e-005			14.331080212438	0.7646648114615			
96	55.789297213438	0.3593052231138			14.331080212438	0.7469608357078			
97	55.807482187234	8.29030000e-005			14.48388242834	0.7469608357078			
98	57.751804626	21.214817839096			14.48388242834	0.7340126768607			
99	57.929812142376	8.29030000e-005			14.757215278116	0.7340143049807			
100	58.32948788428	0.0835202985425			14.757215278116	0.7198218970527			
101	58.652265775	0.5129484705945			14.928022912308	0.7198235252428			
102	58.777874175	23.122790525885			14.928022912308	0.7057946088478			
103	58.858838238116	8.29030000e-005			15.122117385087	0.7085604918982			
104	60.307527895408	0.103807008213			15.122117385087	0.6951914260124			
105	60.80573273438	0.103177980468			15.320053922503	0.6951925901644			
106	61.700117177371	8.29030000e-005			15.320053922503	0.6823190459021			
107	64.03563429767	8.29030000e-005			15.778993197025	0.6823205810872			
108	64.308231125	25.25700463197			15.778993197025	0.6699147523402			
109	64.354284283584	8.29030000e-005			16.045624134007	0.6699182598129			
110	66.777171165	75.799406768868			16.045624134007	0.6579654927977			



Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl...	2: Time	3: GravPat...	4: Time	5: GravPat...	6: Time	7: GravPat...	8: Time
430	313.2593823644	49.510640089318			87.287704484714	3.7768033561743			
431	313.35196208314	58.878794412979			87.704367989217	3.7768037031862			
432	313.83502503644	0.2713759765303			87.704367989217	3.7815129999146			
433	313.89018252253	8.29000000e-005			87.362778767871	3.7815153555421			
434	314.10428042503	48.775182402656			87.802778767871	3.74854594336			
435	314.20744879481	8.29000000e-005			89.205218838439	3.7403125615379			
436	314.85189428346	0.0830130583958			89.205218838439	3.7352510652089			
437	314.77255296346	0.1945181705835			89.315242638439	3.7362376219163			
438	315.00176889235	8.29000000e-005			89.315242638439	3.7212926714278			
439	315.94662943846	0.1909824612647			89.480713791891	3.7212926714278			
500	316.07223062252	8.29000000e-005			89.480713791891	3.7084871344836			
501	316.87347483846	0.840727985213			90.000114963439	3.7084875814535			
502	317.07315491021	8.29000000e-005			90.000114963439	3.6917593772633			
503	317.36938831346	0.4827345901225			90.213186875001	3.8299637773675			
504	318.86647123842	8.29000000e-005			90.213186875001	3.814825580619			
505	320.14487831346	0.414726598304			90.378555000001	3.8584085058184			
506	320.18145176473	8.29000000e-005			90.378555000001	3.940830102054			
507	320.83772372502	100.764120118322			90.87748078572	3.8408304284319			
508	320.82558732348	8.29000000e-005			90.87748078572	3.8253761914577			
509	322.30467109002	51.583792346146			92.930174840847	3.8253765165557			
510	322.4358314833	8.29000000e-005			92.930174840847	3.8100430146378			
511	324.05806718095	0.3874074388887			92.930174840847	3.810043038386			
512	324.40051731121	8.29000000e-005			92.930174840847	3.8948291610522			
513	324.6078893085	49.187469571788			92.96438733871	3.8948294845203			
514	324.76539307321	8.29000000e-005			92.96438733871	3.8797332462082			
515	325.42446143095	0.226882834755			93.415925295187	3.879733567528			
516	325.54210415481	8.29000000e-005			93.415925295187	3.8645733012421			
517	325.80062160595	0.138335613535			93.460136800001	4.0052887882807			
518	325.85584630595	0.138335613535			93.460136800001	3.9888937830585			
519	325.86584630595	0.2101656641753			94.009218375001	3.9927942001043			
520	326.48702771346	0.0893952427407			94.009218375001	3.9774661338035			
521	326.92017839459	8.29000000e-005			95.361722502324	3.9774664585995			
522	327.44026501221	0.0544794			95.361722502324	3.9623151714778			
523	327.91870301765	0.0551408000001			95.461405875001	3.9641434864875			
524	327.92356550002	0.070104038891			95.461405875001	3.9480707075275			
525	328.1439842511	8.29000000e-005			95.860358747338	3.9480710227386			
526	328.90447885346	0.04572727179			95.860358747338	3.9341174013772			

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl...	2: Time	3: GravPat...	4: Time	5: GravPat...	6: Time	7: GravPat...	8: Time
527	329.94831968815	8.29000000e-005			95.563009343123	3.9341127403929			
528	329.38734117238	0.0414251999999			95.563009343123	3.9192870259613			
529	329.44842875002	87.88761879613			97.432146529589	3.9192870387914			
530	329.77971748195	8.29000000e-005			97.432146529589	3.9045323210518			
531	331.074335353002	148.70759461244			98.003989099078	3.9045323210518			
532	331.92356797309	8.29000000e-005			98.003989099078	3.8899098414671			
533	332.39242193048	0.385522051573			98.948434587302	3.889910151294			
534	333.85980530915	8.29000000e-005			98.948434587302	3.8753955618547			
535	334.84085127899	0.0544794			99.278988434415	3.875395571183			
536	334.7222753662	8.29000000e-005			99.278988434415	3.8609891950919			
537	335.67405874619	0.0551408000001			99.389312275002	3.8612580549512			
538	335.78505725824	8.29000000e-005			99.389312275002	3.8469551065995			
539	338.05557712098	0.0551408000001			99.525087831096	3.8471582317847			
540	338.71818130174	0.0729523060001			99.525087831096	3.8329631718888			
541	339.04595341120	8.29000000e-005			100.17376213904	3.8329634777929			
542	340.82647872502	48.354823341819			100.17376213904	3.818871700301			
543	340.90484240754	8.29000000e-005			101.01562035	3.8542037971092			
544	342.33776805003	49.460025232767			101.01562035	3.9468829040795			
545	343.15821388971	8.29000000e-005			101.67287575689	3.9468832077425			
546	343.17123446348	97.220386359428			101.67287575689	3.9252933055246			
547	343.26584788888	8.29000000e-005			101.81560809883	3.9252933055246			
548	344.36797874834	0.0727571			101.81560809883	3.9209585404135			
549	344.78857783863	8.29000000e-005			101.863261022256	3.920958941388			
550	346.35578980003	48.359433755566			101.863261022256	3.8067524692528			
551	346.81417892888	8.29000000e-005			103.52501818944	3.9067527685149			
552	346.76371501338	0.1278723746885			103.52501818944	3.8925486890026			
553	346.72846792503	47.88384688229			103.63881858844	3.8925486890026			
554	346.97215072503	48.016738739175			103.63881858844	3.8788351843035			
555	347.07083182887	8.29000000e-005			103.91521273654	3.878835462505			
556	347.26025541087	0.0729523000001			103.91521273654	3.8946325853211			
557	347.81203860003	48.40585515648			104.26883485606	3.8946331534637			
558	347.85982874247	8.29000000e-005			104.26883485606	3.8511298207728			
559	348.88279405003	48.46287223794			104.28253968812	3.8511301168442			
560	348.87485110003	48.580725258852			104.28253968812	3.8374250274604			
561	349.40066316040	8.29000000e-005			104.48327083071	3.8374250274602			
562	350.00000000e-005				104.48327083071	3.8228174312638			
563					104.48327083071	3.822817757254			

Run 2, Data Delay within the 2<sup>nd</sup> LAN



Run 2, the 3<sup>rd</sup> LAN

Extend

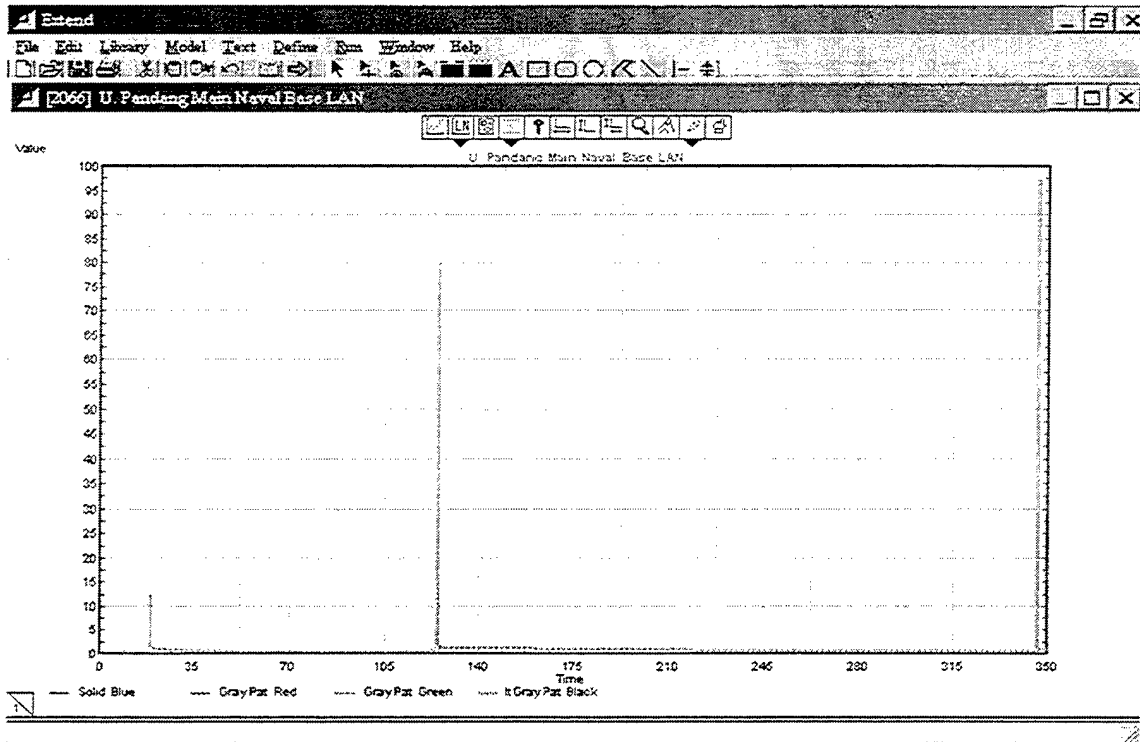
File Edit Library Model Text Define Run Window Help

[1604] Juanda Naval Air Base LAN

Point Number	Time	1-Solid St...	2-Time	2-GrayPat...	3-Time	3-GrayPat...	4-Time	4-GrayPa...
0	0.4229518437412	3.48000000e-005			3.4499518437412	3.48000000e-005		
1	32.10017732274	3.48000000e-005			3.7865246051559	3.48000000e-005		
2	63.32632943647	3.48000000e-005			3.7865246051559	3.48000000e-005		
3	138.7237202935	3.48000000e-005			3.6897041134698	3.48000000e-005		
4	259.46091000740	3.48000000e-005			3.6897041134698	3.48000000e-005		
5	350	3.48000000e-005			32.10017732274	3.48000000e-005		
6					32.10017732274	3.48000000e-005		
7					34.011221250435	3.48000000e-005		
8					34.011221250435	3.48000000e-005		
9					40.93831714746	3.48000000e-005		
10					40.93831714746	3.48000000e-005		
11					44.8011495556	3.48000000e-005		
12					44.8011495556	3.48000000e-005		
13					48.025197335412	3.48000000e-005		
14					48.025197335412	3.48000000e-005		
15					53.315625510728	3.48000000e-005		
16					53.315625510728	3.48000000e-005		
17					58.02386548995	3.48000000e-005		
18					58.02386548995	3.48000000e-005		
19					63.32632943647	3.48000000e-005		
20					63.32632943647	3.48000000e-005		
21					70.480375318181	3.48000000e-005		
22					70.480375318181	3.48000000e-005		
23					76.957322404658	3.48000000e-005		
24					76.957322404658	3.48000000e-005		
25					88.305016726984	3.48000000e-005		
26					88.305016726984	3.48000000e-005		
27					104.51362268228	3.48000000e-005		
28					104.51362268228	3.48000000e-005		
29					114.87749407047	3.48000000e-005		
30					114.87749407047	3.48000000e-005		
31					119.97426230189	3.48000000e-005		
32					119.97426230189	3.48000000e-005		
33					127.3653903021	3.48000000e-005		
34					127.3653903021	3.48000000e-005		
35					127.3653903021	3.48000000e-005		
36					177.99999999999	3.48000000e-005		

Run 2, Data Delay within the 3<sup>rd</sup> LAN

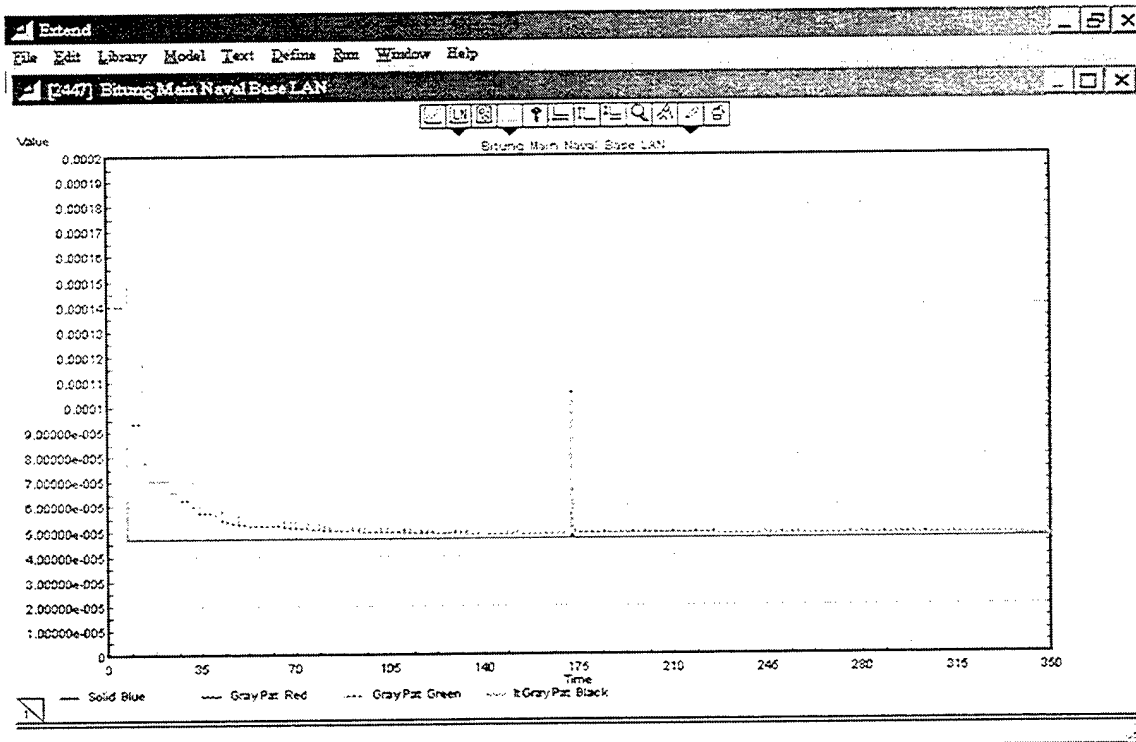




Run 2, the 4<sup>th</sup> LAN

Point Number	Time	1: Solid Bl...	2: Time	2: GrayPat ...	3: Time	3: GrayPat ...	4: Time	4: It GrayPa...
0	12.0127984090955	5.84000000e-005			2.0127984090955	5.84000000e-005		
1	4.463110859516	5.84000000e-005			2.035597452375	0.0001188		
2	19.180217925	12.084883087811			2.035597452375	5.84000000e-005		
3	19.203591697735	5.84000000e-005			4.463110859516	5.84000000e-005		
4	110.28659582371	0.179418543008			4.463110859516	5.84000000e-005		
5	113.47016364855	5.84000000e-005			5.0326542355158	7.78866687e-004		
6	124.7298273	79.513531083931			5.0326542355158	5.84000000e-005		
7	125.27873137852	5.84000000e-005			6.3636309040051	7.30000000e-005		
8	181.87000895344	0.0847389901891			6.3636309040051	5.84000000e-005		
9	181.98582017538	5.84000000e-005			7.3617801283845	7.00800000e-005		
10	180.38578484705	0.0970130071221			7.3617801283845	5.84000000e-005		
11	182.5002325253	5.84000000e-005			7.5749855315428	6.81333333e-005		
12	240.43741518178	0.104726840695			7.5749855315428	5.84000000e-005		
13	250.75858228261	5.84000000e-005			14.802288126013	6.67428571e-005		
14	330.46238951348	0.1730805050836			14.802288126013	5.84000000e-005		
15	333.17814430728	5.84000000e-005			17.717878711542	6.57000000e-005		
16	346.24048327503	97.132114359425			17.717878711542	5.84000000e-005		
17	346.7875730311	5.84000000e-005			18.53428530154	6.48888889e-005		
18	350	5.84000000e-005			18.53428530154	5.84000000e-005		
19					19.180217925	1.2085467087811		
20					19.180217925	1.0988788261648		
21					19.203591697735	1.0988841352565		
22					19.203591697735	1.007127123842		
23					20.861038855254	1.0071316909509		
24					20.861038855254	0.8268602990624		
25					23.87237639909	0.8268602990624		
26					23.87237639909	0.883260182415		
27					25.975472770742	0.883260182415		
28					25.975472770742	0.8057133791874		
29					26.235396878438	0.8057172725207		
30					26.235396878438	0.7553599429682		
31					27.877447010672	0.7553599429682		
32					27.877447010672	0.7109304404694		
33					30.512742802343	0.7109304404694		
34					30.512742802343	0.8714075462223		
35					35.821800073824	0.8714075462223		

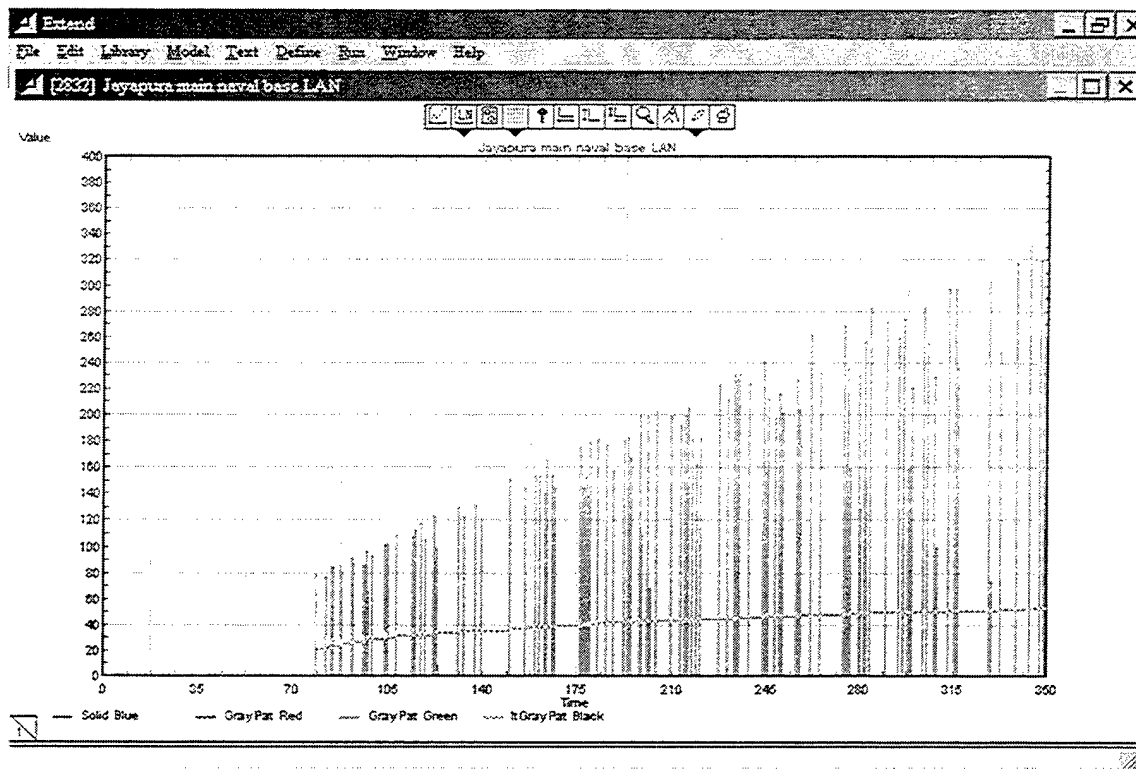
Run 2, Data Delay within the 4<sup>th</sup> LAN



Run 2, the 5<sup>th</sup> LAN

Point Number	Time	1-Solid Blue	2-Time	2-GrayPat	3-Time	3-GrayPat	4-Time	4-GrayPat
0	0.0001398	0.0001398			0.0001398	0.0001398		
1	7.1787566222812	4.66000000e-005			7.1787566222812	0.0001894		
2	13.341620488985	4.66000000e-005			7.1787566222812	9.32000000e-005		
3	23.470647103424	4.66000000e-005			13.341620488985	0.0001185		
4	32.025731532254	4.66000000e-005			13.341620488985	7.76666667e-005		
5	65.1677754228	4.66000000e-005			15.614147112027	9.32000000e-005		
6	129.14676297199	4.66000000e-005			15.614147112027	6.99000000e-005		
7	172.51787895001	0.0001050724041			23.470647103424	8.15500000e-005		
8	173.283314098	4.66000000e-005			23.470647103424	6.52400000e-005		
9	256.73383876331	4.66000000e-005			26.890433619841	7.45600000e-005		
10	350	4.66000000e-005			26.890433619841	5.21223332e-005		
11					32.025731532254	6.99000000e-005		
12					32.025731532254	5.99142857e-005		
13					33.283150391949	6.65714286e-005		
14					33.283150391949	5.82500000e-005		
15					33.870384084825	5.40750000e-005		
16					33.870384084825	5.69555556e-005		
17					39.787794791257	6.21353333e-005		
18					39.787794791257	5.59200000e-005		
19					40.903816715525	6.05800000e-005		
20					40.903816715525	5.50727273e-005		
21					41.578822432134	5.92090909e-005		
22					41.578822432134	5.43666667e-005		
23					42.995075057175	5.82500000e-005		
24					42.995075057175	5.57682308e-005		
25					43.888125718546	5.79538462e-005		
26					43.888125718546	5.32571429e-005		
27					46.755098893073	5.65857142e-005		
28					46.755098893073	5.28133333e-005		
29					46.548330357953	5.59200000e-005		
30					46.548330357953	5.24250000e-005		
31					52.371342903806	5.53675000e-005		
32					52.371342903806	5.20623529e-005		
33					65.1677754228	5.48235294e-005		
34					65.1677754228	5.17777773e-005		
35					65.24852552606	5.43666667e-005		
36					65.24852552606	5.15047637e-005		

Run 2, Data Delay within the 5<sup>th</sup> LAN



The image shows a screenshot of a CAD software interface. At the top, there is a menu bar with the following options: File, Edit, Library, Model, Text, Define, Run, Window, and Help. Below the menu bar is a toolbar with various icons for file operations and editing. The command line at the top of the workspace displays the text: [332] Jayapura main naval base LAN. The main workspace area shows a 3D model of a ship's hull, rendered in a wireframe style. The model is positioned on a coordinate system with X, Y, and Z axes. The bottom status bar indicates the current view is 'Top' and the unit is 'mm'.

Extend

5

File Edit Library Model Text Define Run Window Help

[2832] Jayapura main naval base LAN

1

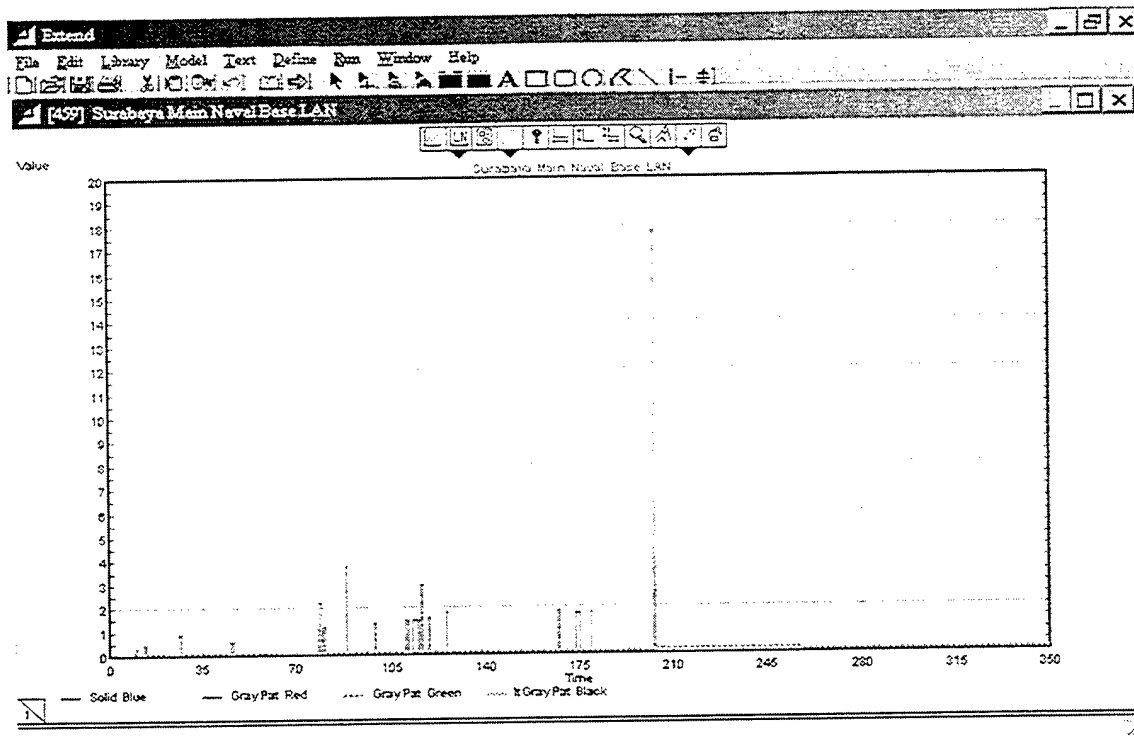
Point Number	Time	1 Solid B...	2 Time	2 GravPat...	3 Time	3 GravPat...	4 Time	4 GravPa...
37	78.262754640148	46.317710530952			29.8652766948	0.0033997552822		
38	78.262754640148	34.568571471676			29.8652766948	0.00332297675		
39	78.262754640148	68.415495404669			30.318420376311	0.00322329675		
40	78.262754640148	62.239635557128			30.318420376311	0.0030781885952		
41	78.262754640148	1.9823852831921			32.293429948041	0.0033894071429		
42	78.262754640148	32.309515346304			32.293429948041	0.0029403885364		
43	78.262754640148	61.987811576636			30.314671555158	0.0029425068182		
44	78.262754640148	1.7935330933405			30.314671555158	0.0033145717591		
45	78.262754640148	38.747840895822			34.448812424258	0.0028156978291		
46	78.262754640148	56.54773054033			34.448812424258	0.0029932395822		
47	78.262754640148	1.7430409462254			38.804650254932	0.003270118126		
48	78.262754640148	1.6092893913052			38.804650254932	0.002592134		
49	78.262754640148	53.328288455099			39.95075174265	0.002594698		
50	78.262754640148	77.42748389422			39.95075174265	0.0024815903846		
51	78.262754640148	52.55534879032			40.881951911148	0.0024858826923		
52	78.262754640148	1.7382213965441			40.881951911148	0.0024045018518		
53	78.262754640148	5.5357752971282			40.50113040457	0.0024052277778		
54	78.262754640148	1.4108853086525			40.50113040457	0.0022032910714		
55	78.262754640148	4.504969202046			50.76227225567	0.0023219553671		
56	78.262754640148	73.173737874342			50.76227225567	0.0022419576021		
57	78.262754640148	1.5871101775893			51.01813505846	0.0022434948276		
58	78.262754640148	55.513857763588			51.01813505846	0.0021687115687		
59	78.262754640148	22.292014266688			55.56380970838	0.002170265		
60	78.262754640148	4.5557407870628			55.56380970838	0.0021032584616		
61	78.262754640148	51.169996735106			61.593808111707	0.002107588774		
62	78.262754640148	1.2021506203032			61.593808111707	0.0020380798875		
63	78.262754640148	33.763549982306			65.214638741133	0.0020375356375		
64	78.262754640148	4.34722027494643			65.214638741133	0.0019757924242		
65	78.262754640148	62.022581529827			66.19738419648	0.0019772945465		
66	78.262754640148	70.405713955081			66.19738419648	0.0019190514706		
67	78.262754640148	1.0313878470992			66.420752868354	0.0019204220588		
68	78.262754640148	62.177848714141			66.420752868354	0.0018655628571		
69	78.262754640148	1.0681380848104			68.46086579439	0.0018688842857		
70	78.262754640148	31.407551820774			68.46086579439	0.0018150263886		
71	78.262754640148	35.985470395491			68.876833325874	0.0018183208233		
72	78.262754640148	1.2511116813893			68.876833325874	0.0017672310811		
73	78.262754640148	1.2418138002703			71.5984247495154	0.0017684265495		

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Extend									
File Edit Library Model Text Define Run Window Help									
[2832] Jayapura main naval base LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GravPat ...	3: Time	3: GravPat ...	4: Time	4: GravPa...	
3870	343.72584980819	0.0220839572593			204.08805395353	43.550831875687			
3871	343.72584980819	4.85000000e-005			204.08805395353	43.528284485228			
3872	347.12624898257	49.791464611386			204.08805395353	43.505680838741			
3873	347.12624898257	85.787465293096			204.08805395353	43.482080293563			
3874	347.12624898257	49.85248058318			204.08805395353	43.460480341905			
3875	347.12624898257	15.67711362518			204.08805395353	43.437929978694			
3876	347.12624898257	1.3123720125308			204.08805395353	43.415399930028			
3877	347.12624898257	219.92220244074			204.08805395353	43.392893242669			
3878	347.12624898257	64.2045301224			204.08805395353	43.370408878235			
3879	347.12624898257	60.278256075319			204.08805395353	43.347846800888			
3880	347.12624898257	64.01382460324			204.08805395353	43.325512973848			
3881	347.12624898257	318.57048822415			204.08805395353	43.303096261140			
3882	347.12624898257	1.1203492143283			204.08805395353	43.280738927141			
3883	347.12624898257	127.71180017982			204.08805395353	43.258341835735			
3884	347.12624898257	1.0458050423594			204.08805395353	43.235997460578			
3885	347.12624898257	1.0391374007093			204.08805395353	43.21367637186			
3886	347.12624898257	49.746679546653			204.08805395353	43.19137825856			
3887	347.12624898257	49.474504800448			204.08805395353	43.16910017982			
3888	347.12624898257	98.199386169626			204.08805395353	43.146851084478			
3889	347.12624898257	15.5983333935683			204.08805395353	43.124621877944			
3890	347.12624898257	59.837821968224			204.08805395353	43.102415584486			
3891	347.12624898257	1.0053526988874			204.08805395353	43.080232148785			
3892	347.12624898257	0.8560335304305			204.08805395353	43.058071555654			
3893	347.12624898257	1.710603841212			204.08805395353	43.035833709558			
3894	347.12624898257	0.9057037882586			204.08805395353	43.013618835708			
3895	347.12624898257	148.24803472143			204.08805395353	42.991728728937			
3896	347.12624898257	15.823578325406			204.08805395353	42.96956604258			
3897	347.12624898257	203.43254604871			204.08805395353	42.947809579782			
3898	347.12624898257	0.8789188994642			204.08805395353	42.925585181585			
3899	347.12624898257	0.8388385852576			204.08805395353	42.903361854882			
3900	347.12624898257	80.957307041513			204.08805395353	42.8811383347888			
3901	347.12624898257	0.5507981897173			204.34739235922	42.903688428466			
3902	347.12624898257	280.28751008547			204.34739235922	42.982109301871			
3903	347.12624898257	15.480035718182			204.34739235922	42.985241817687			
3904	347.12624898257	48.470396703878			204.34739235922	42.985293488056			
3905	347.12624898257	298.033283808979			204.34739235922	42.98532880874			
3906	347.12624898257	170.85377259457			204.34739235922	42.98532880874			

Extend									
File Edit Library Model Text Define Run Window Help									
[2832] Jayapura main naval base LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GravPat ...	3: Time	3: GravPat ...	4: Time	4: GravPa...	
3906	347.12624898257	170.85377259457			204.34739235922	42.98532880874			
3907	347.12624898257	157.72423587841			204.34739235922	42.988437798618			
3908	347.12624898257	146.9049918443			204.34739235922	42.97845185713			
3909	347.12624898257	15.378342277679			204.34739235922	43.102817834329			
3910	347.12624898257	246.3169074654			204.34739235922	43.080538375295			
3911	347.12624898257	222.8508987085			204.34739235922	43.05847772817			
3912	347.12624898257	29.162540388287			204.34739235922	43.036441960479			
3913	347.12624898257	15.29219067904			204.34739235922	43.014428135333			
3914	347.12624898257	0.1204790138713			204.34739235922	42.992437118904			
3915	347.12624898257	15.007315133848			204.34739235922	42.970488576687			
3916	347.12624898257	14.85855988717			204.34739235922	42.948522474247			
3917	347.12624898257	0.1106038539441			204.34739235922	42.926588777221			
3918	347.12624898257	59.38560328077			204.34739235922	42.904697461314			
3919	347.12624898257	4.66000000e-005			204.34739235922	42.904697461314			
3920	348.85187746288	15.276557094722			209.54021485515	42.882818488056			
3921	348.85187746288	29.295389922175			209.54021485515	42.907920887972			
3922	348.85187746288	59.538951381898			209.54021485515	42.941850988897			
3923	348.85187746288	198.18005128898			209.54021485515	42.943897755281			
3924	348.85187746288	60.180851873518			209.54021485515	43.020733261794			
3925	348.85187746288	15.462746969356			209.54021485515	43.121255620138			
3926	348.85187746288	15.808818015801			209.54021485515	43.15081823746			
3927	348.85187746288	97.7858385857833			209.54021485515	43.151815258782			
3928	348.85187746288	15.108130578806			209.54021485515	43.152878473258			
3929	348.85187746288	286.82352524678			209.54021485515	43.158643830831			
3930	348.85187746288	0.3190670461306			209.54021485515	43.208137380532			
3931	348.85187746288	14.943254737709			209.54021485515	43.212080588806			
3932	348.85187746288	87.873046380413			209.54021485515	43.219284110586			
3933	348.85187746288	0.4755885955143			209.54021485515	43.246773724119			
3934	348.85187746288	107.19559271304			209.54021485515	43.248778265212			
3935	348.85187746288	63.480170800861			209.54021485515	43.322232174859			
3936	348.85187746288	109.346324726994			209.54021485515	43.351480453196			
3937	348.85187746288	0.3880263432347			209.54021485515	43.352414588883			
3938	348.85187746288	148.588085108034			209.54021485515	43.44330144443			
3939	348.85187746288	248.21582485785			209.54021485515	43.475089830644			
3940	348.85187746288	4.88000000e-005			209.54021485515	43.508844585631			
3941	350.4.65000000e-005				209.54021485515	43.512594833708			
3942					209.54021485515	43.508844585631			

Run 2, Data Delay within the 6<sup>th</sup> LAN



Run 3, The 1<sup>st</sup> LAN, Using Simulation Set Up 350, Mean 1 sec, T1 Line 1.544 Mbps

Point Number Time 1 - Solid Bl 2 - Time 2 - GrayPat 3 - Time 3 - GrayPat 4 - Time 4 - ItGrayPa

0	0.0002112	0.0002112			0.0002112	0.0002112	
1	0.011219133333	0.011219133333			0.011219133333	0.011400333333	
2	1.534125766667	0.003513124906			0.011219133333	0.005715166667	
3	1.9775073518102	7.0400000e-005			1.534125766667	0.007471728852	
4	2.2223256	0.0580811466371			1.534125766667	0.0049811525746	
5	2.3458361761833	0.0031998566667			1.9775073518102	0.0050046192413	
6	3.1511577510258	7.0400000e-005			1.9775073518102	0.000753464431	
7	3.8954356462079	0.0031998566667			2.2223256	0.0207737519400	
8	4.0516261943542	7.0400000e-005			2.2223256	0.0165196014722	
9	5.6231325598786	0.0040101333333			2.3458361761833	0.0172589748055	
10	6.465352952395	7.0400000e-005			2.3458361761833	0.0143824790046	
11	7.8211180666665	0.0040229338752			3.1511577510258	0.0143642123379	
12	7.7809307547239	7.0400000e-005			3.1511577510258	0.013378962897	
13	9.5824710333333	0.0040440999035			3.1511577510258	0.012049543325	
14	9.8810744	0.2591476576819			3.8954356462079	0.0168044692535	
15	10.130075146144	0.0040101333333			3.8954356462079	0.0112044425888	
16	11.18991730946	0.0023896			4.0516261943542	0.009873267438	
17	12.042864975093	7.0400000e-005			4.0516261943542	0.008705940694	
18	12.106727385667	0.0035251426502			5.6231325598786	0.006716074023	
19	13.474135933334	0.4187472122998			6.5201326603786	0.0055196430624	
20	13.495128501138	7.0400000e-005			6.465352952395	0.0055260430924	
21	17.321159180246	0.0105285503716			6.465352952395	0.0078155095023	
22	17.5468489654	0.0107494029275			8.8153456397846	0.007821405169	
23	18.978809682307	0.0752347546546			8.8153456397846	0.0072197595406	
24	20.78024055404	0.0023896			7.8211180666665	0.007538252233	
25	21.515629363208	9.65224735e-005			7.8211180666665	0.006957041359	
26	24.0111746753612	7.0400000e-005			7.7809307547239	0.007007327075	
27	24.947408037825	0.0023896			7.7809307547239	0.0065340171935	
28	26.572742463208	0.8704130404116			8.464771481872	0.0065387105269	
29	26.7346917424	7.0400000e-005			8.464771481872	0.0061300411189	
30	27.240630729446	0.0031998566667			8.8773248556576	0.0061344411189	
31	28.495990515005	0.0023896			8.8773248556576	0.0057735919413	
32	28.60346793058	7.0400000e-005			9.5994710333333	0.0060114674651	
33	31.277154784173	0.0179643391773			9.5994710333333	0.0058775253837	
34	31.947873379558	7.0400000e-005					

Run 3, Data Delay within the 1<sup>st</sup> LAN

Extend								
File Edit Library Model Text Define Run Window Help								
Surabaya Main Naval Base LAN								
Point Numbers	Time	1: Solid Bl...	2: Time	2: GravPat...	3: Time	3: GravPat...	4: Time	4: GravPa...
35	158.463648820599	0.00319988666657			9.8810744	0.020074616366		
36	136.461243100545	7.04000000e-005			9.8810744	0.019018057809		
37	136.05030355084	0.0095344698767			10.130075146144	0.019229117259		
38	138.529827632448	0.0023896			10.130075146144	0.0192676613951		
39	139.283521931208	7.04000000e-005			11.189917309946	0.0193871415961		
40	46.24660295054	0.0134057792628			11.189917309946	0.0175115632344		
41	140.876795274036	7.04000000e-005			12.093854976096	0.01751146158153		
42	141.381839862419	0.0023896			12.093854976096	0.0167187633873		
43	140.249907005977	7.04000000e-005			12.153823453555	0.0167219833873		
44	145.595112050641	0.5537819630181			12.153823453555	0.0159946403444		
45	146.428093984174	0.0074112028555			12.467440457416	0.015998001214		
46	146.464523952719	7.04000000e-005			12.467440457416	0.0153014178301		
47	152.160968280771	0.00319988666657			13.106727365657	0.0154782987822		
48	55.295293494582	7.04000000e-005			13.106727365657	0.0148591068309		
49	55.614485283938	0.0023896			13.474125833334	0.0318026533282		
50	55.352785112119	7.04000000e-005			13.474125833334	0.030933274297		
51	58.755985295174	0.0023896			13.485126501138	0.030369030122		
52	58.06760462103	0.0040101303333			13.485126501138	0.0292702512286		
53	59.40363370483	7.04000000e-005			15.088698548081	0.0292702512286		
54	64.24098817509	0.0056112053314			15.088698548081	0.0292702512286		
55	64.355582785551	7.04000000e-005			17.321153180248	0.028607001198		
56	68.254142460844	0.00753681002			17.321153180248	0.0278205528808		
57	68.995024705249	0.00319988666657			17.54564960654	0.0279612219473		
58	70.853220677681	7.04000000e-005			17.54564960654	0.0270581811527		
59	71.808740304211	0.00319988666657			18.378809553207	0.029580083675		
60	72.122430854552	0.0023896			18.378809553207	0.0286122642296		
61	72.143944517512	0.0079392462054			20.760240554704	0.0289890480976		
62	72.995381484176	0.0078681222354			20.760240554704	0.0277628059636		
63	74.101587751803	7.04000000e-005			21.515629253208	0.027795325422		
64	74.358878063651	0.0023896			21.515629253208	0.026955276819		
65	74.520429250848	0.0088973738548			24.011748753612	0.0289556510153		
66	74.625888311202	7.04000000e-005			24.011748753612	0.026162847458		
67	75.801544731851	0.0023896			24.347408037625	0.0262331268089		
68	75.952297918099	7.04000000e-005			24.347408037625	0.0254838118144		
69	76.467924352297	0.0023896			26.572743463208	0.0502525568262		
70	120.546794101	1.10781100007055			26.572743463208	0.0490420707106		

Extend								
File Edit Library Model Text Define Run Window Help								
[439] Surabaya Main Naval Base LAN								
Point Numbers	Time	1: Solid Bl...	2: Time	2: GravPat...	3: Time	3: GravPat...	4: Time	4: GravPa...
70	130.545384181	1.1035198887258			26.572743463208	0.0489238737199		
71	78.507518015606	0.0023896			26.7346017424	0.0489558292754		
72	78.842192577851	7.04000000e-005			26.7346017424	0.0473328637546		
73	78.847842317514	2.1508992079077			27.377714719793	0.0473346014672		
74	79.800177947504	7.04000000e-005			27.377714719793	0.0462810593138		
75	80.137318717516	1.144652851468			27.349680723446	0.0462852683311		
76	80.889032467754	7.04000000e-005			27.349680723446	0.0452738462467		
77	82.351514182035	0.0023896			28.469890518005	0.0453551210406		
78	82.093884230423	7.04000000e-005			28.469890518005	0.0442017430148		
79	86.60721929341	0.0023896			28.60046708058	0.0442035030146		
80	87.020612520603	0.00319988666657			28.60046708058	0.0431253687947		
81	87.021856264596	7.04000000e-005			29.292023238028	0.0431270858676		
82	88.595138794185	3.7718808157588			29.292023238028	0.0421002504601		
83	88.781478263875	0.0040101303333			29.759702879223	0.0421019258805		
84	89.237954732327	7.04000000e-005			29.759702879223	0.0411228121068		
85	92.534656912719	0.0023896			31.277154784173	0.0415407037083		
86	92.583916050635	7.04000000e-005			31.277154784173	0.0405965963085		
87	94.782227884138	0.004041927326			31.847873379586	0.0405981963088		
88	95.27365681752	0.008455067035			31.847873379586	0.0388860148555		
89	95.55631035724	7.04000000e-005			33.025002402538	0.0388975791		
90	96.082713383844	0.00319988666657			33.025002402538	0.03885468825		
91	96.683023953266	7.04000000e-005			34.37321582708	0.0388381188848		
92	98.832045317522	1.3097897618847			34.37321582708	0.0380068182872		
93	109.259150259213	0.00319988666657			34.769798055096	0.0380113161596		
94	100.02431880376	0.0023896			34.769798055096	0.0372194137396		
95	101.0049020043	7.04000000e-005			35.468248820699	0.0372680776285		
96	101.03472547501	0.00319988666657			35.468248820699	0.0362551377687		
97	104.43608415108	0.0023896			36.461943100546	0.0365286740034		
98	105.26438051731	0.00319988666657			36.461943100546	0.0357980425223		
99	105.65377243587	7.04000000e-005			37.288215852017	0.0357974505223		
100	110.09256837071	0.0023896			37.288215852017	0.0350585367287		
101	110.40219878419	1.3900388051438			38.053303550984	0.0352824901146		
102	111.5778324638	7.04000000e-005			38.053303550984	0.0346838086893		
103	112.67082848187	0.0040101303333			38.528627632448	0.034683846354		
104	112.93837701055	7.04000000e-005			38.528627632448	0.0339851821857		
105	112.18216276006	1.497569201786			38.528627632448	0.0339851821857		



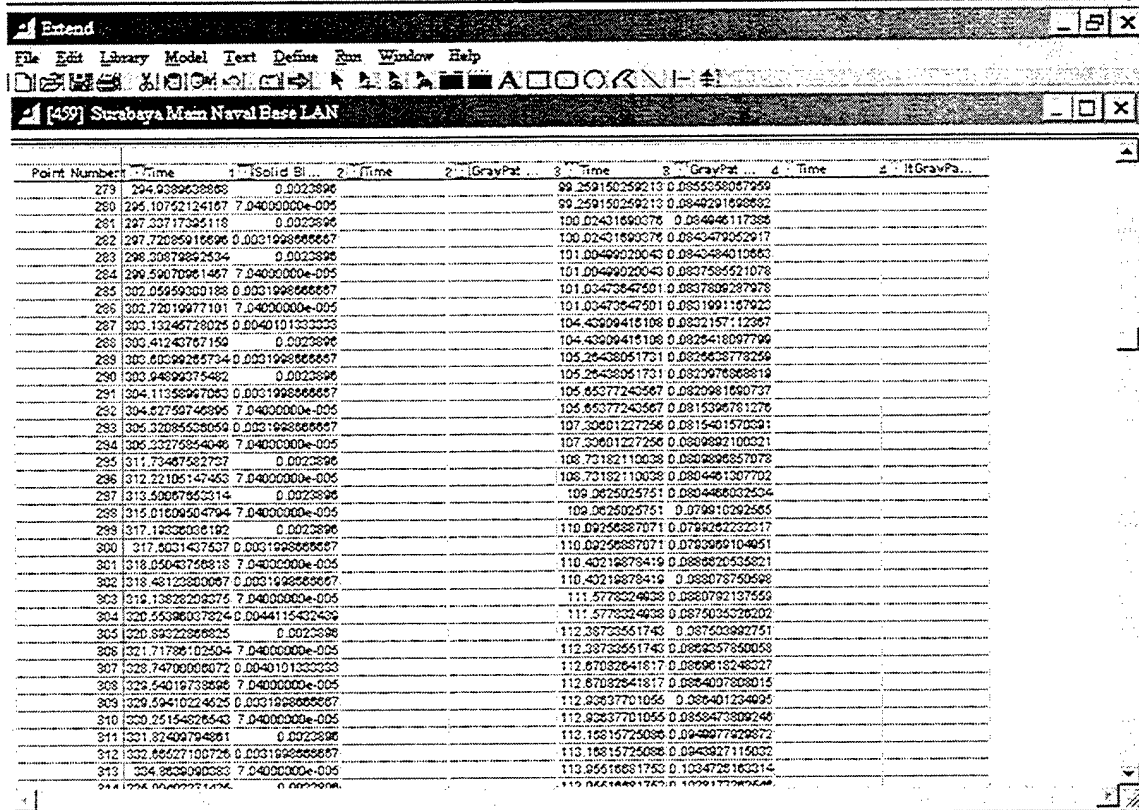
Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya Main Naval Base LAN									
Point Number	Time	Solid Bl	Time	GravPat	Time	GravPat	Time	GravPat	Time
105	110.16815725088	1.427464281795			39.283521931208	0.03399774804875			
106	110.95516981753	1.4255450580034			39.283521931208	0.03399774804875			
107	115.35474805379	7.04000000e-005			40.004272581510	0.03399774804875			
108	116.05962311753	2.6279283599958			40.004272581510	0.03399774804875			
109	116.81442545088	0.0080115625210			40.03540441123	0.03399774804875			
110	117.73890072501	7.04000000e-005			40.03540441123	0.03399774804875			
111	118.08181512344	0.0031898855557			40.24580295084	0.03399774804875			
112	118.77334646705	7.04000000e-005			40.24580295084	0.03399774804875			
113	118.80493554008	1.5401340297454			40.676795274035	0.03399774804875			
114	119.40749835242	7.04000000e-005			40.676795274035	0.03399774804875			
115	119.8411734592	0.00401010030333			40.703004715774	0.03399774804875			
116	121.08311495	7.04000000e-005			40.703004715774	0.03399774804875			
117	120.19930272179	0.00401010030333			41.094198519911	0.03399774804875			
118	124.08504425058	7.04000000e-005			41.094198519911	0.03399774804875			
119	125.5140768775	0.0022896			41.881839382418	0.03399774804875			
120	125.5575534342	1.8082881091517			41.881839382418	0.03399774804875			
121	126.05256825052	7.04000000e-005			42.265007005877	0.03399774804875			
122	126.41847332313	0.0022896			42.265007005877	0.03399774804875			
123	126.20189359613	7.04000000e-005			42.528585807331	0.03399774804875			
124	128.72072291753	0.00501182180505			42.528585807331	0.03399774804875			
125	131.09348765087	0.0094858548403			42.623585807331	0.03399774804875			
126	131.5972731181	7.04000000e-005			44.296023277054	0.03399774804875			
127	132.78372911753	0.00501182180505			44.296023277054	0.03399774804875			
128	133.0413661842	0.0047219204112			45.208475464897	0.03399774804875			
129	133.44929385753	7.04000000e-005			45.208475464897	0.03399774804875			
130	135.72873672738	0.0031938565558			45.595112950841	0.03399774804875			
131	135.79736571693	0.0022896			45.595112950841	0.03399774804875			
132	135.9729928242	0.0134295130872			45.595112950841	0.03399774804875			
133	138.58288146	7.04000000e-005			46.464623582719	0.03399774804875			
134	138.1473858342	0.0055643279337			46.464623582719	0.03399774804875			
135	141.1195283321	0.00401010030333			47.588218560994	0.03399774804875			
136	141.18895925818	0.0022896			47.588218560994	0.03399774804875			
137	143.34214277014	7.04000000e-005			47.783788118609	0.03399774804875			
138	143.37600340678	0.0031938565558			47.783788118609	0.03399774804875			
139	143.47522556723	0.0045199827131			50.305707183403	0.03399774804875			
140	143.7795022547	7.04000000e-005			50.305707183403	0.03399774804875			

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya Main Naval Base LAN									
Point Number	Time	Solid Bl	Time	GravPat	Time	GravPat	Time	GravPat	Time
140	143.722292347	7.04000000e-005			50.305707183403	0.03399774804875			
141	144.83330347492	0.0031938565558			51.7579280736	0.03399774804875			
142	146.88070592358	7.04000000e-005			51.7579280736	0.03399774804875			
143	148.2615578635	0.0022896			52.120236872814	0.03399774804875			
144	149.03254365851	0.0031938565558			52.120236872814	0.03399774804875			
145	149.32095831754	0.0111026951484			52.180968380771	0.03399774804875			
146	149.97559360384	7.04000000e-005			52.180968380771	0.03399774804875			
147	150.56882015037	0.0079158050386			52.394287722328	0.03399774804875			
148	151.20346889439	7.04000000e-005			52.394287722328	0.03399774804875			
149	151.3007235038	0.0022896			55.29639849582	0.03399774804875			
150	151.47180810251	7.04000000e-005			55.29639849582	0.03399774804875			
151	151.55477028178	0.0031938565558			55.814485283998	0.03399774804875			
152	152.39193832794	7.04000000e-005			55.814485283998	0.03399774804875			
153	150.04019547992	0.0022896			55.893788112119	0.03399774804875			
154	151.89418580146	7.04000000e-005			55.893788112119	0.03399774804875			
155	154.24094225038	0.0031938565558			57.413000301484	0.03399774804875			
156	154.94622718129	7.04000000e-005			57.413000301484	0.03399774804875			
157	157.24287585058	1.7685903928338			57.413000301484	0.03399774804875			
158	157.38888301755	1.7772131259651			57.672246408617	0.03399774804875			
159	157.73657211755	0.0054415576054			57.672246408617	0.03399774804875			
160	158.32980411075	7.04000000e-005			58.579470651018	0.03399774804875			
161	158.57495879154	0.0031938565558			58.579470651018	0.03399774804875			
162	160.45400505458	7.04000000e-005			58.755935285174	0.03399774804875			
163	171.40627680747	0.0022896			58.755935285174	0.03399774804875			
164	171.88740307751	7.04000000e-005			58.08780492105	0.0288068870838			
165	173.7989295088	1.7074011928575			58.40353370463	0.0288068870838			
166	173.9872638422	1.7004852379623			58.40353370463	0.0288068870838			
167	175.2702022523	7.04000000e-005			59.775142131253	0.0288068870838			
168	175.28346780508	0.0119796724151			59.775142131253	0.0288068870838			
169	176.56256267314	0.0022896			61.565470528323	0.0288068870838			
170	176.31578181852	0.0031938565558			61.565470528323	0.0288068870838			
171	179.55951431765	1.744793855216			62.797324258919	0.0275373852282			
172	179.88014605398	7.04000000e-005			62.797324258919	0.0275373852282			
173	180.5159402071	0.0031938565558			64.240806817509	0.0275373852282			
174	180.89401324292	7.04000000e-005			64.240806817509	0.0275373852282			
175	180.7795022547	7.04000000e-005			64.240806817509	0.0275373852282			

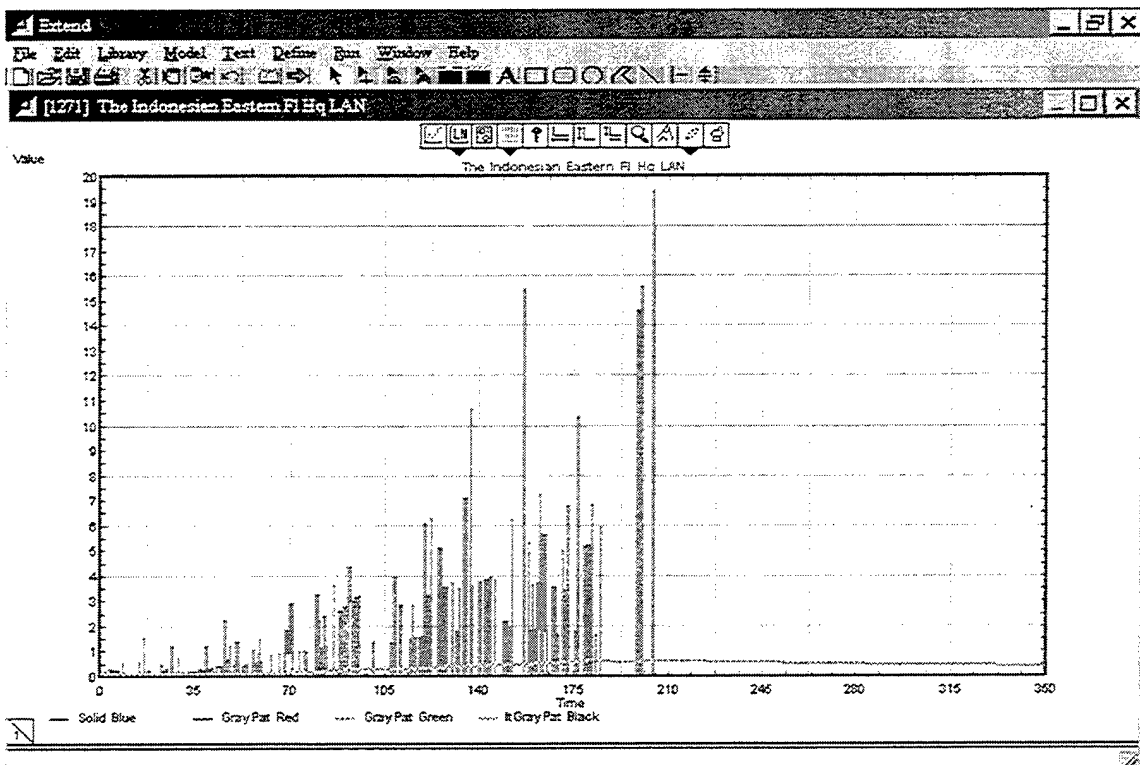


Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya Main Naval Base LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GrayPat...	3: Time	3: GrayPat...	4: Time	4: It GrayPa...	
175	182.48568495089	0.0009414798056			64.255582783561	0.0272692821954			
176	184.19125913415	0.0040101333333			64.255582783561	0.0298328814081			
177	184.3758168417	0.0023896			65.287228904797	0.029834020594			
178	184.54036453419	7.04000000e-005			65.287228904797	0.0258835352254			
179	186.45994054556	0.0023896			67.980405328673	0.0268644181476			
180	190.46094104528	7.04000000e-005			67.980405328673	0.0263911827834			
181	191.95409311749	0.0023896			68.254142463044	0.0264655995951			
182	192.06038603575	7.04000000e-005			68.254142463044	0.026177731567			
183	192.02492035444	0.0040101333333			69.995034705248	0.0262125123282			
184	193.63182483124	7.04000000e-005			69.995034705248	0.026306573697			
185	197.2202559588	0.0040101333333			70.409640146435	0.0259650650283			
186	200.08201524955	7.04000000e-005			70.409640146435	0.0255688409321			
187	200.75082447289	0.0023896			70.804395999805	0.0257229820656			
188	202.20389059307	7.04000000e-005			70.804395999805	0.0254621143872			
189	202.83283460407	0.0040101333333			70.802220677881	0.0254628559399			
190	203.00144624829	17.702481754759			70.802220677881	0.0251877220238			
191	203.5301001783	7.04000000e-005			70.841747437943	0.0251884653572			
192	204.75175851736	0.0040101333333			70.841747437943	0.0246287805997			
193	205.81614215293	7.04000000e-005			71.808740030421	0.0249617883758			
194	206.46248514118	0.0023896			71.608740030421	0.0247070569485			
195	206.51886471969	0.0031988588686			72.122433055452	0.024731440622			
196	207.27918085873	7.04000000e-005			72.122433055452	0.0244816280604			
197	209.35261907695	0.0023896			72.143944617512	0.0245816224868			
198	209.60412146605	0.0040101333333			72.143944617512	0.0243182042718			
199	210.05518503312	0.0023896			72.989381484179	0.0243848954038			
200	210.50899303264	7.04000000e-005			72.989381484179	0.0241603519742			
201	211.81885389301	0.0031988588686			74.101587751803	0.0241540400039			
202	213.73158304919	7.04000000e-005			74.101587751803	0.0239172448018			
203	214.79773401121	0.00367558373			74.356976080981	0.0239406720529			
204	217.41052178406	0.0023896			74.356976080981	0.0237082383436			
205	217.43168990099	7.04000000e-005			74.520429250848	0.0237572031383			
206	217.56618118928	0.0031988588686			74.520429250848	0.0235485954159			
207	221.04856216278	7.04000000e-005			74.525886311202	0.0235472723389			
208	222.07913243213	0.0023896			74.525886311202	0.0233230128024			
209	223.48883201173	7.04000000e-005			75.801544731851	0.0233467706676			
210	224.72670183451	0.0040101333333			76.091644731851	0.0231564276776			

Extend									
File Edit Library Model Text Define Run Window Help									
[459] Surabaya Main Naval Base LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GrayPat...	3: Time	3: GrayPat...	4: Time	4: It GrayPa...	
210	224.73928105381	0.0040101333333			75.801544731851	0.0231564276776			
211	224.97869222413	0.0031988588686			75.942297918009	0.0231261917288			
212	225.39374065599	0.0040101333333			75.942297918009	0.0229100590958			
213	225.72778025795	0.0031988588686			76.198993690988	0.0229107170397			
214	227.49618157717	7.04000000e-005			76.198993690988	0.0226985807798			
215	227.56336959035	0.0031988588686			76.467624352897	0.0227207069258			
216	228.24248844874	0.0023896			76.467624352897	0.0225122599403			
217	229.56381031556	7.04000000e-005			78.120546384181	0.0236372138713			
218	231.28305203386	0.0035454242121			78.120546384181	0.023240511927			
219	231.52858758717	0.0031988588686			78.507518015806	0.0232822355634			
220	232.07877395319	7.04000000e-005			78.507518015806	0.0220768339017			
221	233.4945557787	0.0031988588686			78.843192577651	0.0220713181259			
222	233.94444584013	7.04000000e-005			78.843192577651	0.0217846970712			
223	234.44207980536	0.0023896			78.847842317614	0.0209894242847			
224	235.37110428176	7.04000000e-005			78.847842317614	0.0205381904414			
225	236.31234481999	0.0031988588686			79.500177947304	0.0205388134603			
226	236.78108095794	0.003099378527			79.500177947304	0.0200954905253			
227	237.52272233431	7.04000000e-005			80.137218717615	0.0201383050118			
228	243.11891187981	0.0023896			80.137218717615	0.0208133806204			
229	243.24693006228	7.04000000e-005			80.889032467784	0.0208133927948			
230	244.07747972881	0.0031988588686			80.889032467784	0.0201000790632			
231	244.47692125447	7.04000000e-005			80.918403025748	0.0201006859585			
232	246.82002988113	0.0040101333333			80.918403025748	0.0208965518918			
233	247.30714061699	0.0023896			82.351514162035	0.02081159758234			
234	248.48778882554	7.04000000e-005			82.351514162035	0.0201192302656			
235	251.60360143093	0.0091812579379			80.098884204023	0.0201198288758			
236	253.75795281843	0.0023896			80.098884204023	0.02076314248693			
237	253.84096562329	0.0040101333333			84.933951524425	0.0207632016569			
238	253.80135802607	0.0031988588686			84.933951524425	0.0207151407612			
239	253.88717354871	7.04000000e-005			85.143014071927	0.02071523364278			
240	254.37781688395	0.0164189037981			85.143014071927	0.0208000306893			
241	254.57574165385	0.0062947789935			86.80721929341	0.0208007518293			
242	254.82732076194	7.04000000e-005			86.80721929341	0.0202348997851			
243	255.36873023295	0.0031988588686			87.020812520603	0.0202612281894			
244	256.0200303194	7.04000000e-005			87.020812520603	0.0208823818212			
245	256.15647575546	0.0040101333333			87.020812520603	0.0208823818212			



[459] Surabaya Main Naval Base LAN							
Point Number	Time	1-Solid Bl	2-GrayPat	3-GrayPat	4-GrayPat	5-GrayPat	6-GrayPat
314	335.09402371405	0.0023896		115.35516581753	0.1023177262546		
315	335.226789165	7.04000000e-005		115.354748055379	0.1023181719242		
316	335.27802021741	0.0040101333333		115.354748055379	0.1021715167546		
317	335.12370342336	7.04000000e-005		115.709348448998	0.1021719595222		
318	335.94678173435	0.0064699229627		115.709348448998	0.101533847752		
319	341.73844857959	7.04000000e-005		115.80182234054	0.101533847752		
320	341.94584960019	0.0031968566557		115.80182234054	0.1009031799008		
321	342.11311522377	0.0023896		115.86244133656	0.1009036171679		
322	342.22084361418	0.0040101333333		115.86244133656	0.1002807553335		
323	343.63558248206	7.04000000e-005		115.05963211753	0.1183543871847		
324	347.45941289325	0.0061402635679		115.05963211753	0.1176283854490		
325	348.5554423342	0.0021995555557		115.81442265039	0.1176774500027		
326	348.95401328169	7.04000000e-005		115.81442265039	0.1169599046759		
327	350	7.04000000e-005		117.73890073501	0.1169633338442		
328				117.73890073501	0.1162514933336		
329				117.85184931351	0.1162516100027		
330				117.85184931351	0.1155515972919		
331				118.06161512344	0.1155708735971		
332				118.06161512344	0.1148788324379		
333				118.77334646704	0.1148788324379		
334				118.77334646704	0.1141954891114		
335				118.77949632356	0.1141954891114		
336				118.77949632356	0.113520152764		
337				118.88638540088	0.1226333737092		
338				118.88638540088	0.121912009227		
339				119.43746835242	0.1219124150404		
340				119.43746835242	0.1211894769407		
341				119.8411734592	0.1212229263128		
342				119.8411734592	0.1205181435475		
343				121.083114465	0.12051855285		
344				121.083114465	0.1198219138162		
345				123.19833272179	0.1198460637776		
346				123.19833272179	0.1191583288708		
347				124.08534400608	0.1191587346886		
348				124.08534400608	0.1184758378487		
349				124.08534400608	0.1174789411264		



Run 3, The 2<sup>nd</sup> LAN, Using Simulation Set Up 350, Mean 1 sec, T1 Line 1.544 Mbps

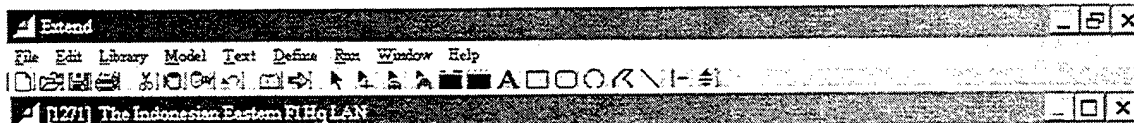
Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FI Hq LAN									
Point Numbers	Time	1 - Solid Bl	2 - Time	3 - GravPat	4 - Time	5 - GravPat	6 - Time	7 - GravPat	8 - Time
0	8.29000000e-005	8.29000000e-005			8.29000000e-005	8.29000000e-005			
1	0.05555555333333	0.05555555333333			0.05555555333333	0.05555555333333			
2	0.7403749257837	0.29000000e-005			0.05555555333333	0.0278047165557			
3	0.9778008230529	0.004831333333			0.7403749257837	0.0278751555557			
4	1.2308008230529	0.0118838925406			0.7403749257837	0.0185841111111			
5	1.4028000005173	0.0102576649140			0.9778008230529	0.0201954888889			
6	1.5043153538185	8.29000000e-005			0.9778008230529	0.0151468165557			
7	1.8965552	0.009012224287			1.3803006328507	0.0181125870026			
8	2.1842948170414	8.29000000e-005			1.3803006328507	0.014440053842			
9	2.1995144	0.05507959256			1.4923809005173	0.018542588246			
10	2.2119222555557	0.1702535046531			1.4923809005173	0.0137653225541			
11	2.2409959333333	0.00267378423225			1.5043153538186	0.0196501599228			
12	2.2674484655557	0.0001400954202			1.5043153538186	0.0118238905882			
13	2.4394810555557	0.0559047165554			1.8965552	0.0121161510874			
14	2.8810558	0.0378388671462			1.8965552	0.0114786322014			
15	3.9251344555557	0.0065137187214			2.1842948170414	0.0114856947014			
16	4.4474810555557	0.0055555522625			2.1842948170414	0.0102106819558			
17	5.5258055388225	8.29000000e-005			2.1995144	0.016383241038			
18	3.0261678	0.3483218320696			2.1995144	0.014750361698			
19	4.0267633	0.0099888305551			2.2119222555557	0.0220757721673			
20	4.1135946928183	8.29000000e-005			2.2119222555557	0.0291597928726			
21	4.1440586333333	0.0118010680106			2.2409959333333	0.0348541421588			
22	4.2619228	0.1381373184636			2.2409959333333	0.0319466303104			
23	4.2833892688556	0.1485970833208			2.2674484655557	0.0319812974288			
24	4.485009500735	8.29000000e-005			2.2674484655557	0.0295027360381			
25	4.7223811286555	0.15985512672			2.4394810555557	0.0346723297004			
26	4.8225650047461	8.29000000e-005			2.4394810555557	0.0321028775789			
27	5.8911389233333	0.2019681728256			2.8810558	0.022582082275			
28	6.8174465576073	8.29000000e-005			2.8810558	0.0304346102187			
29	8.1065782287426	8.29000000e-005			2.9251344555557	0.0309185581314			
30	8.2756074614407	0.46287517015			2.9251344555557	0.0289854294682			
31	8.5406653999999	0.315023885546			3.4474810555557	0.0415279952659			
32	8.5517008929488	0.006331332323			3.4474810555557	0.039085172015			
33	8.850825871795	8.29000000e-005			3.5258055388225	0.0390900484856			
34	10.310516986657	0.0067289159448			3.5258055388225	0.0389183781253			
35	10.4019677	0.0228538925057			3.8109502724644	0.039229846808			

Run 3, Data Delay within the 2<sup>nd</sup> LAN

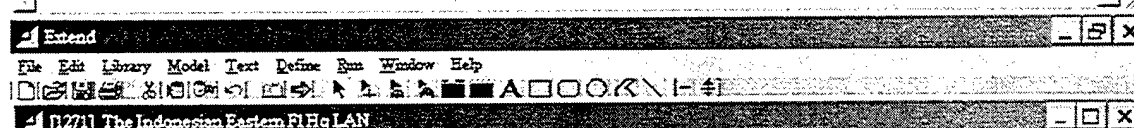
Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FI Hq LAN									
Point Numbers	Time	1 - Solid Bl	2 - Time	3 - GravPat	4 - Time	5 - GravPat	6 - Time	7 - GravPat	8 - Time
35	10.4019677	0.0228538925057			3.8109502724644	0.039229846808			
36	11.464797440684	8.29000000e-005			3.8109502724644	0.0340786882676			
37	11.899831465557	0.0097342183533			3.8261678	0.0481271346404			
38	12.531543599374	8.29000000e-005			3.8261678	0.0467207778162			
39	13.3600734	0.010099245766			4.0267803	0.046219219351			
40	13.409329850501	8.29000000e-005			4.0267803	0.0440185041438			
41	14.3065844	0.0303796533779			4.1135946928188	0.0440222517828			
42	14.382239507077	8.29000000e-005			4.1135946928188	0.0420212403191			
43	14.5559474	0.550299648591			4.1440586333333	0.0425821979559			
44	14.767462912941	8.29000000e-005			4.1440586333333	0.04071155781			
45	15.0299572	0.0141889126884			4.2619228	0.046717637978			
46	15.046147560453	8.29000000e-005			4.2619228	0.0447710667289			
47	15.427832185557	0.0061210977221			4.2930892666656	0.0508501140339			
48	15.767807388583	8.29000000e-005			4.2930892666656	0.0488161094726			
49	16.157793533334	1.504600388508			4.485009500735	0.0488194254726			
50	16.349157399293	8.29000000e-005			4.485009500735	0.0469417562621			
51	16.38308265557	0.510791469727			4.8408529310027	0.0469440437238			
52	16.421728241848	8.29000000e-005			4.8408529310027	0.0462062421042			
53	16.991177448592	0.007961885587			4.7238112666856	0.0522018351772			
54	17.013632992082	0.0963531533333			4.7238112666856	0.0603662165352			
55	17.156377875536	8.29000000e-005			4.8325690047461	0.0503691803482			
56	18.175898632207	0.1782094477437			4.8325690047461	0.0465323120816			
57	18.52976719654	0.180201108282			4.9187817021346	0.0488351708223			
58	18.825259882738	8.29000000e-005			4.9187817021346	0.0470139983262			
59	19.087636563207	0.0063912472361			5.0200573642803	0.0470167816596			
60	19.374564425408	0.0043341333333			5.0200573642803	0.0465000916238			
61	21.519638027584	8.29000000e-005			5.1016225342557	0.0465027581221			
62	22.482178329875	0.1857904481494			5.1016225342557	0.0440308046808			
63	22.571154226878	0.4315240157702			5.853756676987	0.044033953058			
64	23.17537893878	0.0251987125218			5.853756676987	0.042747534842			
65	23.413810465626	0.0043341333333			5.8911389333333	0.0489686915943			
66	23.75109296541	0.2037897158838			5.8911389333333	0.0474213771558			
67	23.819795812482	0.0048341333333			6.8174465576073	0.0474338153709			
68	24.671953304656	8.29000000e-005			6.8174465576073	0.0480739035032			
69	24.859278329875	0.2548187518246			8.1065782287426	0.0468086210746			
70	24.9695177335	0.0047444			8.1065782287426	0.0448009061587			

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern F.Hq LAN									
Point Number	1: Time	1: Solid Bl...	2: Time	2: GrayPat...	3: Time	3: GrayPat...	4: Time	4: It GravPa...	
72	25.360087992478	0.004834133333			8.2758074514407	0.0582758794575			
73	25.717751422221	8.29000000e-005			8.5485853369999	0.0520872575325			
74	26.199818929875	0.860721363572			8.5485853369999	0.0504533923285			
75	26.325289553208	1.2064171295725			8.5517008989486	0.0505205700478			
76	26.794807915417	8.29000000e-005			8.5517008989486	0.0502661964588			
77	27.883197583209	0.0078479803162			8.560825671766	0.0502663220978			
78	27.888623046588	8.29000000e-005			8.560825671766	0.0575916140454			
79	28.521527253209	0.0083035420742			10.061823013011	0.057593865454			
80	29.011236329875	0.75992558860278			10.061823013011	0.0581889524633			
81	29.150444617508	0.0160309351803			10.291372276056	0.0581889524633			
82	29.44887831327	8.29000000e-005			10.291372276056	0.0548531038527			
83	29.524121984173	0.0094739438297			10.310519986667	0.0537339386851			
84	29.51148646393	8.29000000e-005			10.310519986667	0.0537339386851			
85	29.472013550339	0.1742085472112			10.4019677	0.0542854225573			
86	30.818200081013	8.29000000e-005			10.4019677	0.053032174692			
87	30.726726484173	0.0142281753452			11.464797440894	0.053032174692			
88	30.835056417508	0.0087177509612			11.464797440894	0.051855482215			
89	31.773569401657	8.29000000e-005			11.88831488667	0.0520717841846			
90	32.01588726084	0.1257615261137			11.88831488667	0.0509397685765			
91	32.135355709478	0.0252131802042			12.531843888374	0.0509415910504			
92	32.568270275674	8.29000000e-005			12.531843888374	0.048857727411			
93	33.231402317508	0.1664286202335			12.835425135806	0.0488594812408			
94	33.597672117508	0.1407483408638			12.835425135806	0.048820751934			
95	34.03342546084	0.1284639819886			12.785789475307	0.0488224739233			
96	34.060240017508	0.1495374238788			12.785789475307	0.0478261015024			
97	34.213558188549	8.29000000e-005			12.85181889503	0.047827783592			
98	34.223430108822	0.0083531323333			12.85181889503	0.0468712377654			
99	35.03190880197	0.0048341333333			13.241472855488	0.0468728957864			
100	35.124185468239	0.1557500132722			13.241472855488	0.0469538193788			
101	35.290055728178	8.29000000e-005			13.2600784	0.0462689159391			
102	36.708085460838	0.2358425813512			13.2600784	0.0453791280641			
103	36.876637535675	8.29000000e-005			13.405329850501	0.0463807232240			
104	37.075970584173	0.1892966752591			13.405329850501	0.0446244822622			
105	37.084423130309	8.29000000e-005			13.441833182386	0.0446280474131			
106	37.264023817508	0.189898257809			13.441833182386	0.0437014809795			
107	37.460102584173	0.2045460602044			14.3065844	0.0442640771532			

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern F.Hq LAN									
Point Number	1: Time	1: Solid Bl...	2: Time	2: GrayPat...	3: Time	3: GrayPat...	4: Time	4: It GravPa...	
108	37.703046165821	8.29000000e-005			14.3065844	0.0434692757504			
109	38.09158546084	0.1979443227858			14.352239607077	0.0434807833231			
110	38.371281226046	8.29000000e-005			14.352239607077	0.042534667612			
111	38.897883384173	1.1662068764506			14.433329890401	0.0428817776622			
112	39.533870584173	0.2542748794407			14.433329890401	0.0419072876539			
113	39.589514002023	8.29000000e-005			14.5559474	0.0515918330023			
114	40.414518817507	0.0403494725048			14.5559474	0.0507021712264			
115	40.910558784173	0.2743556147859			14.767462912941	0.0507036005368			
116	41.010830488148	8.29000000e-005			14.767462912941	0.0489442174768			
117	41.54254546084	0.3088372545317			14.973843315072	0.0489442225616			
118	41.87681535084	0.012074879188			14.973843315072	0.0489148821855			
119	42.048034031627	8.29000000e-005			15.0399572	0.0482513440633			
120	42.148831317507	0.3889270038119			15.0399572	0.0484439448803			
121	44.925901150841	0.0161058859994			15.045147580453	0.0484439448803			
122	44.962592198721	8.29000000e-005			15.045147580453	0.0478838281258			
123	45.954882964174	0.5758559555886			15.268369164844	0.0478552652228			
124	46.029818945192	8.29000000e-005			15.268369164844	0.0469080737111			
125	46.143385460841	0.5862300436869			15.427632186667	0.0469106958972			
126	46.188812760841	0.0188565357315			15.427632186667	0.0461778173363			
127	46.183435817507	2.2343753067446			15.797607388852	0.0461789131488			
128	46.74754650581	8.29000000e-005			15.797607388852	0.0464884883311			
129	46.840131390791	0.0079818866657			15.77763333334	0.068146261543			
130	46.772972117508	0.6401250542913			15.77763333334	0.0675750125762			
131	46.823708841265	8.29000000e-005			15.349157299293	0.0675782688268			
132	46.013965460841	1.2097811031222			15.349157299293	0.0685676876124			
133	46.237873944782	8.29000000e-005			15.363906268857	0.0741614213387			
134	46.194633036322	0.0079818866657			15.363906268857	0.0731003710259			
135	46.268355450841	0.0231888878582			15.421728241848	0.0731015901435			
136	46.363443284175	0.4668507146991			15.421728241848	0.0729421468031			
137	46.70213863592	8.29000000e-005			15.820817732509	0.0729433461574			
138	50.059195017508	1.3279036633374			15.820817732509	0.071014157558			
139	51.257505317508	1.2390379948956			15.991177448592	0.0711276885204			
140	51.418573846554	8.29000000e-005			15.991177448592	0.0701360971327			
141	52.820853917508	0.374612382082			17.013822892882	0.0702156778836			
142	53.824328117508	0.0362271880826			17.013822892882	0.0692400815244			
143	53.962217962125	8.29000000e-005			17.150377875338	0.0692415129133			



Point Number	Time	Solid Bl.	Time	GrayPat	Time	GrayPat	Time	HGrayPa...
144	54.079990594175	0.400354785251			17.55377875338	0.0582929990578		
145	54.427380694284	0.29000000e-005			19.175859853207	0.0707068277741		
146	54.518005912985	0.0079518855887			18.175859853207	0.0697510301015		
147	54.571187298124	0.29000000e-005			18.52975719654	0.0724002505181		
148	54.905123394175	0.0083532604631			18.52975719654	0.07143491198446		
149	55.043424755155	0.29000000e-005			18.625299853209	0.0714360191779		
150	55.565956250842	0.012285555930			18.825299853209	0.0704950715571		
151	55.507835149838	0.29000000e-005			18.844349354047	0.0704971622486		
152	55.423391884175	0.5003478285581			18.844349354047	0.0695010147538		
153	55.502252117538	0.9994926522299			19.087936583207	0.0599540179946		
154	55.805181217538	0.0087142485485			19.087936583207	0.0587714318854		
155	57.068201267094	0.29000000e-005			19.074654425408	0.0588354679047		
156	58.050195917538	0.4088354909444			19.074654425408	0.0579521403406		
157	58.2570092916	0.29000000e-005			21.519938027584	0.0579621977077		
158	58.56560950842	0.0140130961252			21.519938027584	0.0571125577254		
159	58.532231894838	0.29000000e-005			22.155707203989	0.0571146829854		
160	58.312094417538	0.0214610527247			22.155707203989	0.0562861175174		
161	58.428118784175	1.477102158433			22.052325232836	0.0562871403742		
162	59.128735354175	0.554556981648			22.052325232836	0.0564787812092		
163	59.585324782751	0.29000000e-005			22.483178328875	0.0578420595543		
164	59.29035950842	0.011911272048			22.483178328875	0.05675246951453		
165	60.752546578142	0.29000000e-005			22.571154828875	0.0722237732871		
166	62.660518584175	0.0054813176222			22.571154828875	0.0713638664622		
167	62.762190050842	0.007789370747			23.177537828875	0.0716839273256		
168	62.940651008788	0.29000000e-005			23.177537828875	0.0708208229882		
169	63.485229817538	0.7805927261428			23.413810455026	0.0708776944651		
170	63.488440717538	0.0101916911234			23.413810455026	0.0700535352172		
171	63.504852874282	0.29000000e-005			23.751002995541	0.072423183074		
172	64.574612845186	0.29000000e-005			23.751002995541	0.0715907329939		
173	65.27013950842	0.0052204047458			23.819795812482	0.0718482974448		
174	65.286329160230	0.0048341333333			23.819795812482	0.0708231540938		
175	65.518105967396	0.29000000e-005			24.871983304555	0.0708330770120		
176	66.00106111751	0.0081098342082			24.871983304555	0.0700371997494		
177	66.001687430433	0.29000000e-005			24.855978328875	0.0729603317824		
178	66.338596784176	0.8451896838559			24.855978328875	0.0720933281058		
179	66.710523924446	0.29000000e-005			24.8695177335	0.0721430438614		



Point Number	Time	Solid Bl.	Time	GrayPat	Time	GrayPat	Time	HGrayPa...
180	67.218385284177	0.000110690981			24.9695177335	0.07105026229618		
181	67.227876643128	0.29000000e-005			24.969528399444	0.0713511739508		
182	69.067725460844	0.9117604203767			24.969528399444	0.07057556177122		
183	69.212120292537	0.29000000e-005			25.390087992478	0.0708281625397		
184	69.314252117511	1.847236093831			25.390087992478	0.0696887203307		
185	69.20955917511	0.9283997308234			25.717751425221	0.0698596114288		
186	69.980319850844	1.9246955403955			25.717751425221	0.06912831769		
187	70.17955917511	2.81718069613			26.159618829675	0.0784056932599		
188	70.422983917511	2.85423842804916			26.159618829675	0.07766942328045		
189	71.120978272714	0.0049341333333			26.325299663208	0.0903695504642		
190	71.274272917512	0.0112554470237			26.325299663208	0.0894272114187		
191	71.396521950846	0.023724096877			26.794807915417	0.0894280749583		
192	72.183248850846	0.0105762087828			26.794807915417	0.0885081380412		
193	73.05247525439	0.29000000e-005			27.102297958042	0.0885069905804		
194	73.809462117512	0.9471091800278			27.102297958042	0.0878038581225		
195	73.809535017512	0.0001085133702			27.386446869475	0.0877604704048		
196	74.219613117513	0.005478082425			27.386446869475	0.0867198303404		
197	74.320181570918	0.29000000e-005			27.683197563209	0.0867990805689		
198	74.487875117513	0.0206947392152			27.683197563209	0.0858310847632		
199	75.228886870049	0.29000000e-005			27.888923049538	0.0859319187632		
200	75.455623917513	1.04891198146			27.888923049538	0.0850811078863		
201	75.460327600994	0.0157046913782			28.573758814211	0.0850810284794		
202	75.582358304328	0.010132169697			28.573758814211	0.0842477919247		
203	75.928137634328	0.0181299207257			28.821927253209	0.0843291991999		
204	76.174631461495	0.29000000e-005			28.821927253209	0.0835104691108		
205	76.235256879418	0.073948187451			29.011236328875	0.0904029514992		
206	76.326566567551	0.0138690463698			29.011236328875	0.0895336923502		
207	76.59463298418	0.9786482078005			29.150444517506	0.0888378359578		
208	76.70527192212	0.29000000e-005			29.150444517506	0.0883288600915		
209	79.549250117515	0.0219915548827			29.44887831327	0.0888344565153		
210	79.639994024735	0.29000000e-005			29.44887831327	0.0879953947133		
211	79.718200560848	0.0152421253008			29.510750253233	0.0878671767888		
212	79.727148584181	3.221338759722			29.510750253233	0.0871747732674		
213	80.591146584182	0.021425295162			29.524131984173	0.0875436386333		
214	80.80982584182	2.2095946402329			29.524131984173	0.0867330289323		
215	81.211468489624	0.29000000e-005			29.811146445293	0.0867339595133		



Extend							
File Edit Library Model Text Define Run Window Help							
[1271] The Indonesian Eastern FHq LAN							
Point Numbers	Time	1: Solid Bl...	2: Time	3: GrayPat...	4: Time	5: GrayPat...	6: Time
216	81.479593550846	1.1307697752327			29.811148445293	0.0859351429673	
217	81.785625354182	1.1091081355637			29.871807312333	0.0859389035178	
218	82.248244294014	8.29000000e-005			29.871807312333	0.0851576407585	
219	83.133337250846	2.3886375483977			30.154080769188	0.0851583943940	
220	83.540075917516	1.2063065788440			30.154080769188	0.0943912015526	
221	84.042855317103	8.29000000e-005			30.473313550839	0.0858600309058	
222	85.310108470846	0.0063531333333			30.473313550839	0.0851931252737	
223	85.254582117517	3.5948393944097			30.818200061013	0.0851938854522	
224	85.822453754834	8.29000000e-005			30.818200061013	0.0844399374394	
225	86.462346460851	2.5927286420468			30.726726484173	0.0846585053309	
226	86.823535460851	1.2912393892118			30.726726484173	0.0839240448245	
227	88.826732117518	2.5705826582431			30.899505417506	0.0839005153242	
228	89.556635017518	1.4003081088241			30.899505417506	0.083170949817	
229	89.845028384188	0.0227037453073			31.771359401857	0.0831718674895	
230	90.022460084188	2.8913882890821			31.771359401857	0.0824546703531	
231	90.222910822946	2.7815802781248			32.015897250840	0.0825388214403	
232	90.861000954195	0.0053340406607			32.015897250840	0.0828248144194	
233	90.871845460852	1.4588058985852			32.125356709478	0.082403118881	
234	91.004657624618	0.0148378346488			32.125356709478	0.082385002311	
235	91.183581880794	8.29000000e-005			32.568270275574	0.082327287735	
236	91.562737217518	0.0162807278918			32.568270275574	0.0818455728242	
237	91.728170904854	8.29000000e-005			33.092887331031	0.0816460894729	
238	92.054609250852	4.3113541237459			33.092887331031	0.0809658558086	
239	92.840346460853	2.9885601122829			33.231402317506	0.0821859323859	
240	93.278394033399	8.29000000e-005			33.231402317506	0.0815067098141	
241	93.484725460853	1.5187852274724			33.587672117506	0.0828899275075	
242	93.794404694188	0.0063102321252			33.587672117506	0.0819920051508	
243	93.84608821752	0.0117468987272			34.033425460840	0.0830291409048	
244	93.93127901173	8.29000000e-005			34.033425460840	0.0823541072393	
245	94.081570584188	1.5478893824839			34.060240017506	0.0835685858526	
246	94.282860031752	1.5614275607702			34.060240017506	0.0828968081796	
247	94.364646460853	3.1258948402538			34.213558188546	0.082896576728	
248	94.927100838173	0.0079818866867			34.213558188546	0.0822334041142	
249	95.403246460854	1.5887517440184			34.323430106822	0.0822842291898	
250	95.747204850854	0.0001517184208			34.323430106822	0.0815311797430	
251	95.948746460854	3.1997495991552			35.031808060197	0.0816695468804	

Extend							
File Edit Library Model Text Define Run Window Help							
[1271] The Indonesian Eastern FHq LAN							
Point Numbers	Time	1: Solid Bl...	2: Time	3: GrayPat...	4: Time	5: GrayPat...	6: Time
252	95.948254487254	8.29000000e-005			35.031808060197	0.0810264785901	
253	96.462113117521	0.0134583710911			35.124185460839	0.082225966473	
254	96.817139807141	8.29000000e-005			35.124185460839	0.0816102582048	
255	98.111841584188	0.0271599791535			35.290055788178	0.081610903881	
256	98.466396884617	8.29000000e-005			35.290055788178	0.0809782611954	
257	100.54655541752	0.0128723442182			35.534209863273	0.0809789038311	
258	100.739937350111	8.29000000e-005			35.534209863273	0.0803559991882	
259	100.77604211752	1.30471188177222			35.708085460839	0.0825532401197	
260	101.09667058419	1.320282870323			35.708085460839	0.0819230546989	
261	101.21562710358	8.29000000e-005			35.875637535573	0.0819236975294	
262	101.69728858419	0.0111533982888			35.875637535573	0.0813030834612	
263	102.1147887832	8.29000000e-005			35.893391794816	0.0813038914815	
264	105.03430072463	0.013192838959			35.893391794816	0.0808923853305	
265	105.20247318059	8.29000000e-005			37.078970584173	0.0821158913594	
266	105.2782575088	0.006968211228			37.078970584173	0.0815028878925	
267	105.77102705234	8.29000000e-005			37.084423130806	0.0815035063462	
268	107.83472391752	1.3051221994185			37.084423130806	0.0808997785726	
269	107.855205284	0.0047444			37.394622917506	0.0823082184191	
270	108.13702457234	8.29000000e-005			37.394622917506	0.0817010255386	
271	108.95212925085	3.9258387591483			37.460102584173	0.082050334754	
272	109.01696525086	1.3055704970736			37.460102584173	0.0825976974658	
273	109.15304381753	2.5879438489856			37.703045165821	0.0825883025751	
274	109.27372878419	1.2870286851785			37.703045165821	0.0818697841506	
275	109.4822304353	8.29000000e-005			38.007818271434	0.082003948752	
276	109.7673792405	0.0048341323233			38.007818271434	0.0814104341627	
277	109.85208112555	8.29000000e-005			38.091565450840	0.0828237746405	
278	110.03847824372	0.0047444			38.091565450840	0.0822421048218	
279	110.18052442828	8.29000000e-005			38.371381922046	0.0822428969046	
280	110.79191991752	2.7825825946888			38.371381922046	0.0815594154259	
281	111.22691589314	8.29000000e-005			38.597883384173	0.0899303881899	
282	114.31563861753	0.0071773563709			38.597883384173	0.0892970738021	
283	114.40867901866	8.29000000e-005			39.433870584173	0.0910877417672	
284	114.48344545086	1.411009183526			39.433870584173	0.090460764652	
285	114.7908108507	8.29000000e-005			39.589514002023	0.0904613442723	
286	115.03579211753	1.444048507358			39.589514002023	0.0898232084371	
287	115.0592754698	0.0047444			39.8381442106	0.0898237858315	

Extend									
File Edit Library Model Text Define Run Window Help									
[L271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GravPat...	3: Time	3: GravPat...	4: Time	4: GravPa...	
288	115.39750739419	2.8082258598678			39.69381442106	0.0892043112479			
289	115.42633875086	0.0130468160151			40.414618817507	0.089462583472			
290	115.42548894884	8.28000000e-005			40.414618817507	0.0898896392847			
291	115.85299310978	0.0046341333333			40.910558764173	0.0907488071112			
292	116.04358558419	0.0046290344467			40.910558764173	0.0901314880832			
293	116.32864454086	1.5017911950041			41.010893488146	0.0901320520288			
294	116.42287878419	1.4996873450154			41.010893488146	0.0895230815097			
295	116.54380182328	0.0098392201934			41.180324408811	0.0895230815097			
296	116.59915725088	1.5553659922049			41.180324408811	0.0892220484646			
297	118.85357051753	0.0081462981131			41.364172244651	0.0892220484646			
298	119.14401722484	8.28000000e-005			41.364172244651	0.0892005281215			
299	119.41928925086	1.5668293790007			41.54254646084	0.0903894411518			
300	119.58842893887	8.28000000e-005			41.54254646084	0.089780835812			
301	119.78453211753	6.0437561782671			41.67681535084	0.0893708315834			
302	120.11893507432	8.28000000e-005			41.87681535084	0.0892795405943			
303	121.18281725086	8.18154499433			42.340034931627	0.0892803917789			
304	121.18889647082	8.28000000e-004			42.340034931627	0.0888985617775			
305	122.22046975086	8.277594113023			42.148931317507	0.061350827814			
306	122.40351271889	8.28000000e-005			42.148931317507	0.0607110461656			
307	124.78856581753	0.0374283709134			44.225831150841	0.0908156261152			
308	124.85573591753	3.4724653578771			44.225831150841	0.0902297214332			
309	125.12333725086	8.28000000e-005			44.892552196721	0.0902302502718			
310	125.15406501753	0.0122255208874			44.892552196721	0.0898518571932			
311	125.58144428734	8.28000000e-005			45.294275347238	0.0896323888035			
312	127.45465211753	3.518875812381			45.294275347238	0.0890813542812			
313	128.17154688716	8.28000000e-005			45.463222062502	0.0890818623066			
314	129.383471842	0.0071140001709			45.463222062502	0.088518072925			
315	129.60414625086	8.28000000e-005			45.964882984174	0.0915302358326			
316	130.42846545087	3.5832448880692			45.964882984174	0.0915302358326			
317	130.48733535733	8.28000000e-005			46.029818945192	0.0915842414186			
318	130.88702891753	0.010960222888			46.029818945192	0.0910118399107			
319	131.25859250788	0.0048341333333			46.143285460841	0.0947382778837			
320	131.28685273243	8.28000000e-005			46.143285460841	0.0941498411764			
321	131.85178375087	0.0134189230898			46.148812750841	0.0942657750626			
322	132.0646033842	1.7976758866929			46.148812750841	0.0938838875825			
323	132.39787854081	8.28000000e-005			46.183435917607	0.1074783277277			

Extend									
File Edit Library Model Text Define Run Window Help									
[L271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl...	2: Time	2: GravPat...	3: Time	3: GravPat...	4: Time	4: GravPa...	
324	132.4310187842	1.7262346699818			46.183435917607	0.1068109837539			
325	132.73782559471	8.28000000e-005			46.247546550581	0.1068174723429			
326	132.77776611753	3.4588234080232			46.247546550581	0.108158146292			
327	132.90696561584	8.28000000e-005			46.255944421689	0.1061666517798			
328	134.5702719532	0.0047444			46.285944421689	0.1055222175358			
329	134.9215905842	7.0504813956713			46.640131380791	0.1055714712639			
330	135.76607973039	8.28000000e-005			46.640131380791	0.1040954885465			
331	137.29971585087	0.842725775573			46.772872117508	0.1068097519846			
332	137.3125905842	3.5830184279732			46.772872117508	0.108158146292			
333	137.54783529283	8.28000000e-005			46.823705841385	0.106158928913			
334	138.84488275872	0.0195329978398			46.823705841385	0.1075148911479			
335	138.93289811688	8.28000000e-005			47.463417552086	0.1075153846033			
336	140.4109587842	1.841495101688			47.463417552086	0.1068791988926			
337	140.8823779842	3.8948294769993			48.213985460841	0.1140375485152			
338	140.88658777286	8.28000000e-005			48.213985460841	0.1133887395057			
339	142.43643365842	0.0048341333333			48.237878544782	0.1133872271527			
340	142.5514627627	0.0079618868887			48.237878544782	0.1127042609121			
341	142.58895405087	3.8463380544012			48.813942141808	0.1127047467074			
342	143.81251821423	8.28000000e-005			48.813942141808	0.1120494855579			
343	144.00940948154	0.0063531333333			48.847894349452	0.1120496875347			
344	144.01481205087	1.8588785197888			48.847894349452	0.1114022798811			
345	144.11188528332	8.28000000e-005			48.895732468722	0.1114027580518			
346	144.50879211754	3.881530941058			48.885732468722	0.1107825130101			
347	144.68539127711	0.0048341333333			48.944693035022	0.1108082711646			
348	144.71225804881	8.28000000e-005			48.944693035022	0.1107590310438			
349	146.04343434388	0.0105807469307			48.968565530841	0.1103575889742			
350	146.22688545087	3.8404655825686			48.968565530841	0.1068308413026			
351	146.26561928421	1.8872710172512			48.963443284175	0.1122754478426			
352	146.35136478827	8.28000000e-005			48.963443284175	0.11154112308			
353	146.42883081754	0.0061381345469			48.963443284175	0.11154112308			
354	147.03222946988	8.28000000e-005			48.963443284175	0.1110143914896			
355	147.24867389387	0.0118881928284			50.059195017508	0.1184746244297			
356	148.29905787238	8.28000000e-005			50.059195017508	0.1178128555782			
357	148.44182384625	0.0048341333333			51.257604317508	0.124734655448			
358	148.77146868421	0.0074409982078			51.257604317508	0.1240418852394			
359	148.93464614246	8.28000000e-005			51.18675848554	0.124041467940			



[1271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl	2: Time	3: GravPat	4: Time	5: GravPat	6: Time	7: GravPat	8: Time
360	149.45401211754	2.1086541789352			51.415575946554	0.12355500723			
361	149.86005462263	8.29000000e-005			51.50073039625	0.12357288034			
362	150.22355211754	2.1412079814021			51.60078039625	0.122675007882			
363	150.46751058421	2.159791810402			52.826853917508	0.1247372911273			
364	151.08580101754	0.0146512277059			52.826853917508	0.1240550367496			
365	151.39939878421	1.8929688882629			53.824328117508	0.1242535944187			
366	151.79109921754	0.0082469888263			53.824328117508	0.1235730811555			
367	152.26659984555	8.29000000e-005			53.992217982125	0.123578738259			
368	152.71675261754	8.1950228064285			53.992217982125	0.1229107652889			
369	152.72222631259	0.0023896			54.079990584175	0.1253461155595			
370	152.9232389322	8.29000000e-005			54.079990584175	0.1246712170887			
371	158.32601792178	0.0048341333333			54.427380594284	0.1246718627877			
372	158.48798142198	8.29000000e-005			54.427380594284	0.124004694038			
373	158.76021741754	15.298555248555			54.518005912985	0.1240476482309			
374	157.31091938421	0.005009514373			54.518005912985	0.1233877183573			
375	157.47679143204	8.29000000e-005			54.571167288124	0.123381568147			
376	157.9702015088	0.0221846717722			54.571167288124	0.1227353124083			
377	158.75295105308	8.29000000e-005			54.787192968342	0.1227357510327			
378	158.75675821754	4.3807511783541			54.787192968342	0.1223897733958			
379	158.93126248702	8.29000000e-005			54.805128384175	0.122133841877			
380	159.33191051754	0.0097384255502			54.805128384175	0.1214642000297			
381	158.5882338421	0.0058314122404			55.043424758155	0.1214640340611			
382	158.8958871171	8.29000000e-005			55.043424758155	0.1208184650037			
383	159.98429211755	1.814813543154			55.565665250842	0.1209258262586			
384	160.21487723088	1.8449928635174			55.565665250842	0.1202692875724			
385	160.46337301755	3.6366194735301			55.807835149806	0.120299667107			
386	160.53834468421	0.0532818024781			55.807835149806	0.1198795955758			
387	160.84048529958	8.29000000e-005			56.282422379443	0.1196800228951			
388	161.39405878421	1.840282758552			56.282422379443	0.116086279188			
389	161.53353965088	1.8672943257317			56.351286104463	0.1190657043182			
390	161.7715537556	8.29000000e-005			56.351286104463	0.1184692211308			
391	162.08952925088	3.6883147171207			56.425391884175	0.1210257918848			
392	162.42052925088	1.8892131527915			56.425391884175	0.1204114475646			
393	162.60525878421	7.2278958075418			56.502252117508	0.125480143273			
394	163.29026546089	3.7148088573604			56.502252117508	0.1248512518287			
395	163.61217591755	1.8793404925034			56.806181317508	0.1248952623845			

[1271] The Indonesian Eastern FHq LAN									
Point Number	Time	1: Solid Bl	2: Time	3: GravPat	4: Time	5: GravPat	6: Time	7: GravPat	8: Time
396	163.66146987687	0.0048341333333			56.806181317508	0.1242678485981			
397	164.21213591755	5.6303753116461			57.008301367534	0.124238065181			
398	165.22048245088	1.7887994349267			57.008301367534	0.1236467248551			
399	165.53742558546	8.29000000e-005			57.532906775218	0.1234471393551			
400	167.28278595088	0.019325109484			57.532906775218	0.1230319794678			
401	167.38270742991	0.0063531333333			57.555747750534	0.1230323918958			
402	167.48261842944	0.0048341333333			57.555747750534	0.1224233206486			
403	167.53585505088	0.007801902141			58.250195917508	0.124842263256			
404	167.7096522404	8.29000000e-005			58.250195917508	0.1242285067092			
405	167.85520148421	3.4818838444208			58.053570062618	0.1242287150638			
406	169.14081088948	8.29000000e-005			58.053570062618	0.123619750794			
407	169.69395878421	1.846052885481			58.805539050842	0.1236884262014			
408	169.69852910073	8.29000000e-005			58.805539050842	0.1230850710102			
409	169.80156198421	0.0388250979189			58.832231894632	0.1230854754005			
410	169.92757878421	1.0254630583908			58.832231894632	0.1224879730927			
411	169.95519068421	1.8285600789648			58.7953595831748	0.1224883755189			
412	169.9803598992	8.29000000e-005			58.7953595831748	0.1218986442372			
413	171.32406725038	1.727238581291			58.812004417508	0.1263481469044			
414	171.47129271755	4.9619567853516			58.812004417508	0.1257407058905			
415	171.83466258421	3.3882739031704			58.828118784175	0.1228421566227			
416	172.11888373696	8.29000000e-005			58.828118784175	0.1222085482188			
417	173.39408879421	6.7442611830358			59.128785384175	0.1247642357638			
418	173.58188405528	8.29000000e-005			59.128785384175	0.1241225013138			
419	176.26707211755	1.7899047568124			59.885324782751	0.1341226860757			
420	176.67034675088	0.0173156822147			59.885324782751	0.1334872425386			
421	176.83882391755	10.292597665981			59.885324782751	0.1304876543007			
422	177.18819088421	5.2780041884241			59.882378327823	0.1328579767731			
423	177.30155601755	3.57842803003			59.972424065168	0.1328583678108			
424	177.46215574821	8.29000000e-005			59.972424065168	0.1322348188051			
425	179.26825988421	0.0133444257694			59.983935850842	0.1322805411027			
426	179.46136211044	0.0161771796108			59.993935850842	0.1316723810051			
427	179.47351030341	8.29000000e-005			60.792554678142	0.1316721483863			
428	179.58896911755	1.7343366724143			60.792554678142	0.1310603170004			
429	179.58146211755	5.1184251922881			60.950394867851	0.1310607225818			
430	179.68877219275	8.29000000e-005			60.950394867851	0.1304539400696			
431	180.04407688421	1.7511085039573			61.047994858025	0.1304542338802			

Extend									
File Edit Library Model Text Define Run Window Help									
[1771] The Indonesian Eastern FHq LAN									
Point Number	Time	Solid Bl	Time	GravPat	Time	GravPat	Time	GravPa	
432	180.04626508422	0.4195120878446			61.047994953025	0.1296531518659			
433	180.14711495505	0.29000000e-005			61.052515102927	0.1296531518659			
434	180.68057878422	0.2546675044896			61.052515102927	0.1296531518659			
435	180.75881878422	0.1510949738406			62.660516584175	0.1296531518659			
436	181.15700058422	1.7262354044486			62.660516584175	0.1296531518659			
437	181.26126703378	0.29000000e-005			62.782190050542	0.1287281589622			
438	181.55705726095	0.7950411372229			62.782190050542	0.1287281589622			
439	182.09031708955	0.29000000e-005			62.940551009785	0.1287281589622			
440	182.73146711795	1.64152229574			62.940551009785	0.1287281589622			
441	182.70910410713	0.29000000e-005			63.4852225917509	0.131146918013			
442	184.60483754174	0.0079618895697			63.4852225917509	0.131146918013			
443	185.04254617055	0.3359190190195			63.4852225917509	0.131146918013			
444	185.03116515506	0.29000000e-005			63.4852225917509	0.131146918013			
445	187.09475441950	0.0047444			63.4852225917509	0.131146918013			
446	187.24292293601	0.29000000e-005			63.4852225917509	0.131146918013			
447	187.18151922539	0.0070129774698			64.574612348186	0.1264308046682			
448	187.64121547625	0.0049341333333			64.574612348186	0.1264308046682			
449	188.29914617783	0.29000000e-005			64.574612348186	0.1264308046682			
450	190.65079319271	0.008423709338			64.574612348186	0.1264308046682			
451	190.7781846555	0.0161450751428			65.063328704158	0.126281132876			
452	191.59227672789	0.017853466603			65.063328704158	0.126281132876			
453	191.62038325724	0.29000000e-005			65.273120850845	0.1277428921048			
454	191.64707811416	0.0048341333333			65.273120850845	0.1277428921048			
455	191.87187648834	0.0081594843207			65.273120850845	0.1277428921048			
456	192.06235533557	0.29000000e-005			65.273120850845	0.1277428921048			
457	194.99899406481	0.0079618895697			65.273120850845	0.1277428921048			
458	195.95592852214	0.29000000e-005			65.273120850845	0.1277428921048			
459	196.93235850444	0.0048341333333			65.273120850845	0.1277428921048			
460	196.98335847205	0.29000000e-005			65.273120850845	0.1277428921048			
461	197.03255310291	0.0048341333333			65.273120850845	0.1277428921048			
462	197.37832380855	0.29000000e-005			65.273120850845	0.1277428921048			
463	197.88338279248	0.0048341333333			65.273120850845	0.1277428921048			
464	198.02188354119	0.29000000e-005			65.273120850845	0.1277428921048			
465	198.63202667254	14.544693087094			65.273120850845	0.1277428921048			
466	199.1350463746	0.29000000e-005			65.273120850845	0.1277428921048			
467	199.67672355884	0.0101436138181			65.273120850845	0.1277428921048			

Extend									
File Edit Library Model Text Define Run Window Help									
[1771] The Indonesian Eastern FHq LAN									
Point Number	Time	Solid Bl	Time	GravPat	Time	GravPat	Time	GravPa	
468	199.9405835515	0.0089125575201			65.001061117511	0.1234638134709			
469	200.0254040938	0.0079618895697			65.001061117511	0.1234638134709			
470	200.26497232073	0.0089125575201			65.001061117511	0.1234638134709			
471	200.26758120703	15.510138422963			65.001061117511	0.1234638134709			
472	200.38117288877	0.0079618895697			65.001061117511	0.1234638134709			
473	200.39201979959	0.29000000e-005			65.001061117511	0.1234638134709			
474	201.34035447654	0.0079618895697			65.001061117511	0.1234638134709			
475	201.56830542794	0.0048341333333			65.001061117511	0.1234638134709			
476	203.18784371054	0.29000000e-005			65.001061117511	0.1234638134709			
477	203.72878109281	0.0089125575201			65.001061117511	0.1234638134709			
478	204.20546098631	0.0089125575201			65.001061117511	0.1234638134709			
479	204.27091764751	0.29000000e-005			65.001061117511	0.1234638134709			
480	204.28023975529	19.35954805141			65.001061117511	0.1234638134709			
481	204.42954184471	0.29000000e-005			65.001061117511	0.1234638134709			
482	204.71702091728	0.0104633804446			65.001061117511	0.1234638134709			
483	204.80672308295	17.900586692788			65.001061117511	0.1234638134709			
484	204.87914705051	0.0032072999687			65.001061117511	0.1234638134709			
485	205.20905855141	0.29000000e-005			65.001061117511	0.1234638134709			
486	205.62589172558	0.0083531333333			65.001061117511	0.1234638134709			
487	205.88784582271	0.29000000e-005			65.001061117511	0.1234638134709			
488	206.46412318255	0.0048341333333			65.001061117511	0.1234638134709			
489	206.30448304198	0.29000000e-005			65.001061117511	0.1234638134709			
490	207.45438867478	0.005740815398			65.001061117511	0.1234638134709			
491	207.52149328112	0.29000000e-005			65.001061117511	0.1234638134709			
492	208.44253781274	0.0083531333333			65.001061117511	0.1234638134709			
493	208.44948142544	0.29000000e-005			65.001061117511	0.1234638134709			
494	210.10311383204	0.0083531333333			65.001061117511	0.1234638134709			
495	210.46673544853	0.0048341333333			65.001061117511	0.1234638134709			
496	210.70466378601	0.29000000e-005			65.001061117511	0.1234638134709			
497	211.24458464159	0.0048341333333			65.001061117511	0.1234638134709			
498	211.47440756316	0.29000000e-005			65.001061117511	0.1234638134709			
499	212.54210954134	0.0083531333333			65.001061117511	0.1234638134709			
500	212.83726254703	0.29000000e-005			65.001061117511	0.1234638134709			
501	213.23980450469	0.0085756584185			65.001061117511	0.1234638134709			
502	213.69754595818	0.0047444			65.001061117511	0.1234638134709			
503	213.85113596038	0.29000000e-005			65.001061117511	0.1234638134709			

Point Number	Time	1 Solid Br...	2 Time	2 GravPat...	3 Time	3 GravPat...	4 Time	4 GravPat...
504	214.14107452817	0.0094532014631			71.274272917512	0.1622752105839		
505	214.37169573283	0.009616912709			71.396621950845	0.1627726840699		
506	214.5847046181	0.29000000e-005			71.396621950845	0.1621521455685		
507	215.05604520304	0.0095891436226			72.183246650845	0.1621737209417		
508	215.78844875135	0.29000000e-005			72.183246650845	0.1615378113056		
509	217.0502910608	0.0048341333333			75.06247525439	0.1615381364047		
510	218.44899538719	0.0047444			75.06247525439	0.1609071280593		
511	218.54854772547	0.29000000e-005			75.275532003591	0.1609074518875		
512	218.7543148944	0.0125289107333			75.275532003591	0.1602815528529		
513	219.8123778040	0.29000000e-005			75.809462117512	0.1639660256809		
514	221.31727762040	0.0048341333333			75.809462117512	0.1633310701132		
515	221.58117791348	0.0048341333333			75.809535017512	0.1633314807077		
516	221.71446539584	0.29000000e-005			75.809535017512	0.1627008071799		
517	222.0331598609	0.0048341333333			74.219613117513	0.1627220132618		
518	222.0432613866	0.29000000e-005			74.219613117513	0.162090169484		
519	222.25793204809	0.0158523895401			74.320181570918	0.1620954783301		
520	222.85934239482	0.0095167181356			74.320181570918	0.1614754180262		
521	224.05352512464	0.29000000e-005			74.482875117513	0.1615547082147		
522	224.77751433569	0.0048341333333			74.482875117513	0.160438381872		
523	225.358988584	0.0048341333333			75.228888970049	0.1604384045994		
524	225.38005082017	0.29000000e-005			75.228888970049	0.1603264715021		
525	225.5348078389	0.008385412246			75.465623917513	0.164318532268		
526	225.59237357686	0.29000000e-005			75.465623917513	0.1638981125852		
527	226.44854119804	0.0048341333333			75.465623917513	0.163755801848		
528	227.09803197396	0.009676460548			75.465623917513	0.163175561807		
529	228.37052813734	0.29000000e-005			75.832358934328	0.1631758907844		
530	228.59233183747	0.0048341333333			75.832358934328	0.162502447586		
531	230.24304860215	0.29000000e-005			75.828137804328	0.1626308051827		
532	232.24276751498	0.0103405380674			75.828137804328	0.1620215017925		
533	232.31886030748	0.29000000e-005			76.174831401495	0.1620218122794		
534	233.32385682073	0.0047444			76.174831401495	0.1614172532783		
535	233.52513643709	0.29000000e-005			76.33525878418	0.160513883081		
536	233.78648502858	0.0048341333333			76.33525878418	0.1594478140719		
537	234.77658275268	0.29000000e-005			76.396565567681	0.1594483721814		
538	234.8943009507	0.007981885897			76.396565567681	0.1588801522945		
539	234.91875098024	0.29000000e-005			76.59453298418	0.1575084789503		

Point Number	Time	1 Solid Br...	2 Time	2 GravPat...	3 Time	3 GravPat...	4 Time	4 GravPat...
540	236.19759267604	0.0048341333333			76.59453298418	0.1608923864908		
541	236.42914055772	0.29000000e-005			76.705267162212	0.1608926723946		
542	236.48804870396	0.0048341333333			76.705267162212	0.1602771937464		
543	236.48806042238	0.007981885897			76.831089952799	0.1602774085258		
544	240.54523571208	0.29000000e-005			76.831089952799	0.1606683337693		
545	242.4807611533	0.0048341333333			77.885737282621	0.1606683337693		
546	242.48384401997	0.0094204058741			77.885737282621	0.1605040073687		
547	243.33251156321	0.29000000e-005			77.950875722815	0.1605040092234		
548	244.35730797098	0.0048341333333			77.950875722815	0.1644640703692		
549	244.2265394688	0.29000000e-005			78.544244840234	0.1644643775327		
550	248.98001574225	0.0048341333333			78.544244840234	0.1638684020679		
551	247.00425451384	0.29000000e-005			79.558056112798	0.1638687914602		
552	247.82071389864	0.0048341333333			79.558056112798	0.1632772083719		
553	247.78092527082	0.0067046571182			79.704407621983	0.1632775075499		
554	248.32556355289	0.29000000e-005			79.704407621983	0.1629801784857		
555	250.33329388889	0.0047444			79.248055212039	0.1629804769871		
556	250.45593851123	0.29000000e-005			79.248055212039	0.1621073566698		
557	251.03938138738	0.0088209054644			79.540350117515	0.1621881768341		
558	251.51200788552	0.0048341333333			79.540350117515	0.16180699434773		
559	253.52812404048	0.29000000e-005			79.889994524735	0.1618072395489		
560	252.58286811652	0.0048341333333			79.889994524735	0.1610321248174		
561	252.5005826748	0.008326764185			79.718800550848	0.161088672562		
562	252.60677872494	0.29000000e-005			79.718800550848	0.1605151380036		
563	252.76327158824	0.007981885897			79.727142954181	0.1719755530461		
564	253.04526601776	0.29000000e-005			79.727142954181	0.1713678865785		
565	255.85708900157	0.0048341333333			80.591146584182	0.1714435812305		
566	256.21101847921	0.29000000e-005			80.591146584182	0.1708396096487		
567	257.68023304282	0.007981885897			80.80982584182	0.1788205212593		
568	257.87144878592	0.29000000e-005			80.80982584182	0.1770937826582		
569	257.74348789675	0.0048341333333			81.2114684885240	0.1779640734652		
570	258.25181884219	0.29000000e-005			81.2114684885240	0.1773717155646		
571	260.44339751833	0.007981885897			81.479583950848	0.181325467031		
572	261.0819565096	0.0048341333333			81.479583950848	0.1806636910125		
573	261.22830528758	0.29000000e-005			81.79562984182	0.1846581462837		
574	264.00788435838	0.0315027302024			81.79562984182	0.1839173223765		
575	264.16239916585	0.29000000e-005			82.2462442940140	0.1839178102237		

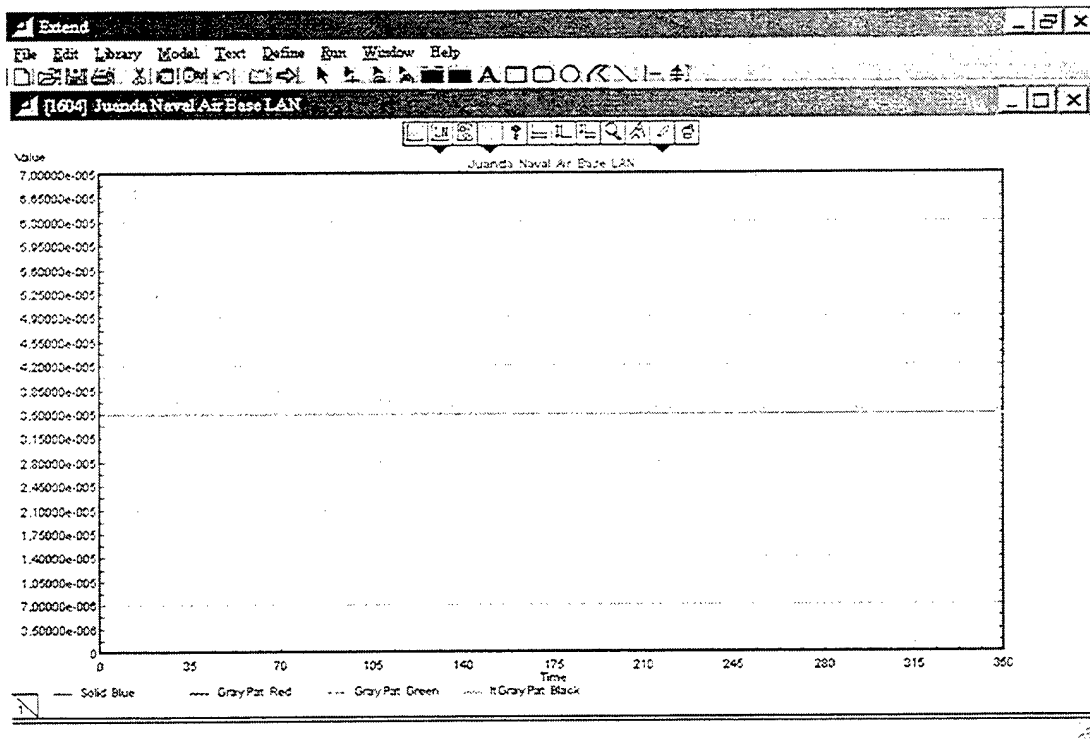
Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FIHQ LAN									
Point Number	Time	Solid Bl...	Time	GravPat	Time	GravPat	Time	GravPa...	
576	265.03441300718	0.0129790239505			82.249244284014	0.1832812171087			
577	265.47683759254	0.0048341333334			82.25814215009	0.1832814039599			
578	265.07728501182	8.29000000e-005			82.25814215009	0.1825494987739			
579	266.46406132314	0.0048341333334			82.50627241443	0.1825497846359			
580	266.53493139544	8.29000000e-005			82.50627241443	0.1832221231408			
581	267.31587878826	0.0154235324004			82.85428984135	0.1832224070255			
582	267.99413216174	8.29000000e-005			82.85428984135	0.1812660428179			
583	268.28140031373	6.0102525854554			83.103307253840	0.1895720081848			
584	268.47107997918	8.29000000e-005			83.103307253840	0.1895720081848			
585	268.81324984631	0.0175407290184			83.540675917518	0.1830460585504			
586	269.78175218987	8.29000000e-005			83.540675917518	0.1823927379989			
587	271.09001960774	0.0084402641285			84.0428550317103	0.1923830799717			
588	271.09940527441	0.0084402641285			84.0428550317103	0.1917408402429			
589	271.4862226078	8.29000000e-005			84.860558585383	0.1917411212699			
590	271.72603154641	0.0083531333334			84.860558585383	0.1910633472016			
591	271.76913181579	8.29000000e-005			85.358508875383	0.1910633472016			
592	272.59731010283	0.0079618888887			85.358508875383	0.1904602143827			
593	272.72092882222	8.29000000e-005			86.310106472846	0.1904715654004			
594	273.00416920776	0.013146962857			86.310106472846	0.189832438940			
595	273.67272525882	0.0096991740793			86.354592117517	0.2018620578225			
596	274.08326834254	8.29000000e-005			86.354592117517	0.2012177464383			
597	275.02407110604	0.0048341333334			86.622463724894	0.2012180207438			
598	275.106878283	8.29000000e-005			86.622463724894	0.2005472969988			
599	275.37709585075	0.0079618888887			87.06272435815	0.2005472969988			
600	275.46678151304	8.29000000e-005			87.06272435815	0.1998813022336			
601	276.4301957074	0.0113535204031			88.462246460851	0.2084850187464			
602	276.46653650447	8.29000000e-005			88.462246460851	0.2078046378898			
603	276.97361940349	0.0079618888887			88.522585460851	0.2120796027281			
604	277.10314254638	8.29000000e-005			88.522585460851	0.2113796700438			
605	277.25936473001	0.007246275654			88.826732117518	0.2198637712251			
606	277.33167463711	8.29000000e-005			88.826732117518	0.2191405251366			
607	281.08742133481	0.0083531333334			89.568835017518	0.2237468118028			
608	281.75807828472	8.29000000e-005			89.568835017518	0.2230102156898			
609	283.53551758546	0.0079618888887			89.846028084185	0.2230876542087			
610	283.55222775301	0.0079991999999			89.846028084185	0.2223359096871			
611	283.71391143827	0.0048341333334			90.022480084185	0.231155958997			

Extend									
File Edit Library Model Text Define Run Window Help									
[1271] The Indonesian Eastern FIHQ LAN									
Point Number	Time	Solid Bl...	Time	GravPat	Time	GravPat	Time	GravPa...	
612	284.43659100097	0.0048341333334			90.022480084185	0.2304030059372			
613	285.08131338097	8.29000000e-005			90.322910922640	0.2393983162829			
614	285.20422002232	0.0048341333334			90.322910922640	0.2385210480223			
615	285.30847301194	8.29000000e-005			90.651006984185	0.238538702582			
616	286.94676239398	0.0048341333334			90.651006984185	0.2378850777978			
617	286.48768088809	0.0048341333334			90.871946460852	0.2425903880857			
618	287.5499955830	8.29000000e-005			90.871946460852	0.2418078185112			
619	289.14000773027	0.0082504052297			91.004887534618	0.2418556818488			
620	289.41989504893	0.0048341333334			91.004887534618	0.2410780108461			
621	289.42357538217	0.0115193833887			91.182591890704	0.2410782774656			
622	290.12877620037	8.29000000e-005			91.182591890704	0.2403055906819			
623	290.20163288616	0.0048341333334			91.558941113872	0.2403055863241			
624	290.82279238862	0.008720154604			91.558941113872	0.2395381059846			
625	290.82617170614	8.29000000e-005			91.552737217518	0.2395601210838			
626	291.79868088069	0.0099522336799			91.552737217518	0.2388270952256			
627	292.55101541958	8.29000000e-005			91.728170904854	0.2388275602583			
628	292.86905982541	0.0079618888887			91.728170904854	0.2380691771466			
629	293.13056678824	8.29000000e-005			92.05469250852	0.2517550156336			
630	293.47199591388	0.0048341333334			92.05469250852	0.2509593192816			
631	293.84296300051	0.0092673410126			92.940346460853	0.2504105532141			
632	294.26598323792	0.0085748329721			92.940346460853	0.2505882065186			
633	294.82539549409	0.0063531333334			93.278394233398	0.2505882031031			
634	295.43086033582	8.29000000e-005			93.278394233398	0.2507730123801			
635	297.20189428924	0.0063531333334			93.484725450853	0.2505427174679			
636	298.01503972216	0.0079618888887			93.484725450853	0.2527185947765			
637	298.14698225629	0.0084407598857			93.784404584186	0.2527353490704			
638	298.65742559452	8.29000000e-005			93.784404584186	0.2519152949889			
639	299.17711157596	0.0048341333334			93.8460821752	0.2519520009225			
640	300.15784131808	8.29000000e-005			93.8460821752	0.2511556510754			
641	302.26859867408	0.0048341333334			93.93127901173	0.2511552093308			
642	302.3826046566	0.0047443999999			93.93127901173	0.2503252273142			
643	302.85694293042	8.29000000e-005			94.081570584188	0.2503223371977			
644	303.43115382973	0.0079618888887			94.081570584188	0.2543114040485			
645	303.47449118554	8.29000000e-005			94.23280031752	0.2591458351035			
646	305.84014958914	0.0089757201191			94.23280031752	0.2683146388888			
647	306.4386871827	8.29000000e-005			94.264646460853	0.2779627308282			

[1271] The Indonesian Eastern FI Hq LAN							
Point Numbers	Time	1 Solid Bl	2 Time	2 GravPat	3 Time	3 GravPat	4 Time
549	305.89629939742	0.0079618955867			94.364545460853	0.2771074608852	
549	305.42254628591	0.29000000e-005			94.927100896170	0.2771319592384	
550	306.89446307663	0.0079618955867			94.927100896170	0.278281860303	
551	307.65127387094	0.29000000e-005			95.423246460854	0.281149197541	
552	307.74431563784	0.0048341333334			95.423246460854	0.2802694140623	
553	308.03584066628	0.29000000e-005			95.747204650854	0.2802698780269	
554	310.88933096211	0.0055566478112			95.747204650854	0.279453357159	
555	310.92346527462	0.29000000e-005			95.946746460854	0.2891906615188	
556	311.79595534423	0.0047443999999			95.946746460854	0.2883116525473	
557	311.80463339111	0.29000000e-005			95.946746460854	0.288311914623	
558	312.11032606375	0.0048341333334			95.946746460854	0.2874582421544	
559	312.11146372187	0.29000000e-005			96.452113117521	0.2874790150395	
560	312.13173040395	0.0047443999999			96.452113117521	0.28651065023627	
561	312.26026739846	0.0048341333334			96.817139307141	0.2865107528159	
562	312.46804951248	0.0047443999999			96.817139307141	0.2857474674158	
563	312.47905382466	0.29000000e-005			97.559028387927	0.2857477171146	
564	312.78080347603	0.0048341333334			97.559028387927	0.284889515862	
565	312.67825387356	0.0079618955867			97.820852595553	0.284889564811	
566	313.15967315089	0.29000000e-005			97.820852595553	0.2840369011405	
567	313.59257958974	0.0063531333334			98.111841584188	0.2841182104487	
568	313.69626034414	0.0048341333334			98.111841584188	0.2832701043613	
569	313.95097946791	0.0079618955867			98.465396854617	0.2832703518245	
570	314.11808482898	0.0047443999999			98.465396854617	0.2824272853012	
571	314.41404787171	0.29000000e-005			98.583126832954	0.2824275320274	
572	315.03501695704	0.0047443999999			98.583126832954	0.2815894081341	
573	316.54263118138	0.29000000e-005			98.92320591755	0.2815897141262	
574	322.37532460222	0.0048341333334			98.92320591755	0.2807586084851	
575	323.14154541772	0.29000000e-005			99.090220054034	0.2807585537314	
576	324.45727811522	0.0174692585879			99.090220054034	0.2799286524224	
577	324.61308471758	0.29000000e-005			99.108305532986	0.2799286529852	
578	325.18354833219	0.0079618955867			99.108305532986	0.2791055865606	
579	325.29514833295	0.29000000e-005			99.181894392339	0.2791058204741	
580	325.41942872391	0.0079618955867			99.181894392339	0.2782873353026	
581	325.55747803132	0.0063531333334			100.2067306557	0.2782875814111	
582	325.67391560097	0.29000000e-005			100.2067306557	0.2774738750328	
583	327.39053001221	0.0047443999999			100.34373002484	0.2774741174304	

[1271] The Indonesian Eastern FI Hq LAN							
Point Numbers	Time	1 Solid Bl	2 Time	2 GravPat	3 Time	3 GravPat	4 Time
585	329.70709800022	0.0063531333334			100.64595541752	0.2767026589393	
586	330.32747805388	0.29000000e-005			100.64595541752	0.2758963154227	
587	330.64351830657	0.0063531333334			100.73926735011	0.2759895964111	
588	331.48153517925	0.0079618955867			100.73926735011	0.2750988504605	
589	332.33435918274	0.29000000e-005			100.77609211752	0.2768806239927	
590	332.67722418948	0.0063531333334			100.77609211752	0.2780746105687	
591	333.40548605909	0.0079618955867			101.09637058419	0.2818923224109	
592	333.76295811799	0.29000000e-005			101.09637058419	0.2810796525057	
593	334.15769850778	0.0063531333334			101.31582710358	0.2810801915106	
594	334.756880301597	0.0073380572876			101.31582710358	0.2802724898198	
595	335.48344138648	0.29000000e-005			101.63728858419	0.280304541237	
596	337.463276782	0.0123482336626			101.63728858419	0.2795013763624	
597	337.8156791288	0.29000000e-005			102.11476867883	0.2795016138682	
598	338.26855975572	0.0060700803059			102.11476867883	0.2787030378585	
599	338.33869060508	0.29000000e-005			102.514482303743	0.2787032747156	
600	339.50587759795	0.0063531333334			102.514482303743	0.2779992462918	
601	340.0695381798	0.29000000e-005			103.248282021132	0.2779994844742	
602	341.04677188872	0.0063531333334			103.248282021132	0.2771188588934	
603	341.46278233401	0.29000000e-005			104.11891465384	0.2771202044047	
604	341.52428460274	0.0079618955867			104.11891465384	0.2763551813327	
605	341.89315467388	0.0084641503277			104.33851437528	0.2763553961769	
606	342.87226863885	0.29000000e-005			104.33851437528	0.2755547877132	
607	343.02780068242	0.0063531333334			104.39599185538	0.275555021894	
608	344.48193881954	0.29000000e-005			104.39599185539	0.2747788105647	
609	346.54883271998	0.009108114697			105.03930073483	0.2748159729223	
610	346.13814684604	0.29000000e-005			105.03930073483	0.2740440179422	
611	346.24324424245	0.0104801365851			105.20247318059	0.274044508074	
612	346.78535605089	0.29000000e-005			105.20247318059	0.2732756168527	
613	347.19242513246	0.0086358291436			105.23535732488	0.2732758520656	
614	348.23343149159	0.29000000e-005			105.23535732488	0.2725135890934	
615	348.35867123732	0.0099180818731			105.27232575688	0.2725236771189	
616	348.62115923756	0.29000000e-005			105.27232575688	0.2717738320358	
617	348.58087963	0.0069066263873			105.77102705234	0.271774063255	
618	349.76512387931	0.29000000e-005			105.77102705234	0.2710191535016	
619	350	0.29000000e-005			106.84618599439	0.2710193655793	
620					106.84618599439	0.2702898194143	

Run 3, Data Delay within the 2<sup>nd</sup> LAN

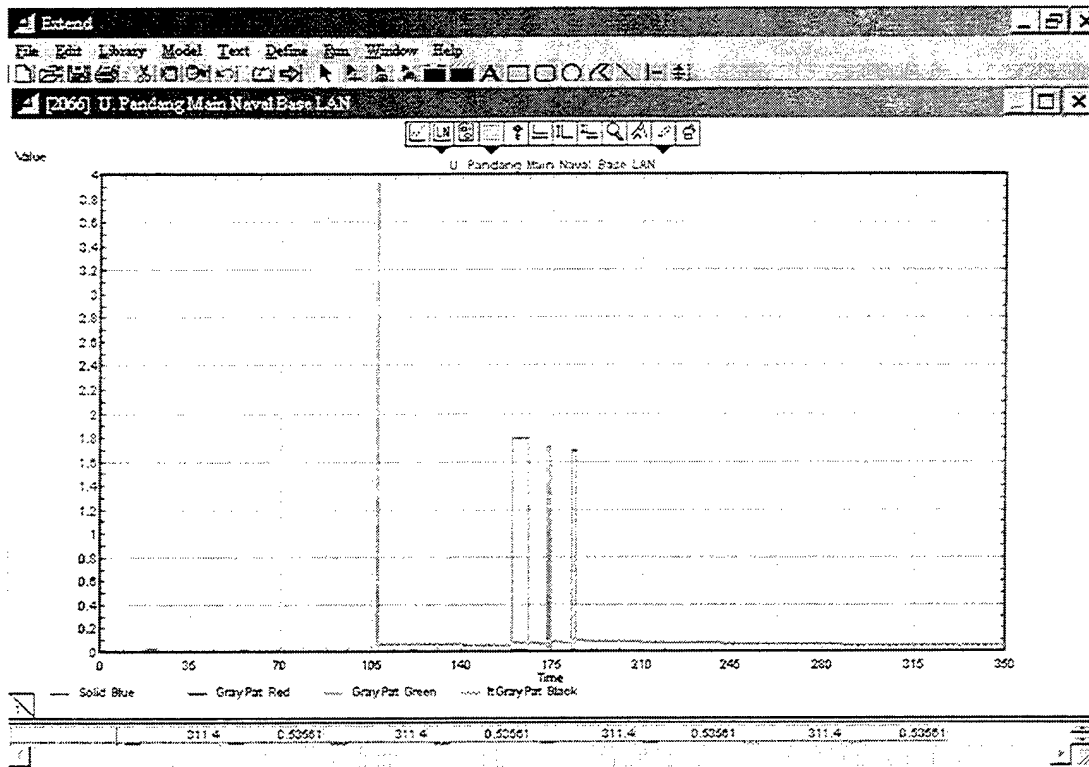


Run 3, the 3<sup>rd</sup> LAN

Point Number	Time	1 - Solid Blue	2 - Time	2 - GrayPat. Red	3 - Time	3 - GrayPat. Green	4 - Time	4 - ItGrayPat. Black
0	3.4699518437412	3.48000000e-005			3.4699518437412	3.48000000e-005		
1	122.748931559582	3.48000000e-005			14.523934183364	3.48000000e-005		
2	68.181299243207	3.48000000e-005			14.523934183364	3.48000000e-005		
3	129.45633102762	3.48000000e-005			22.748931559582	3.48000000e-005		
4	257.14287502722	3.48000000e-005			22.748931559582	3.48000000e-005		
5	950	3.48000000e-005			22.945254040354	3.48000000e-005		
6					22.945254040354	3.48000000e-005		
7					29.27950815934	3.48000000e-005		
8					29.27950815934	3.48000000e-005		
9					32.587216128202	3.48000000e-005		
10					32.587216128202	3.48000000e-005		
11					37.441339523448	3.48000000e-005		
12					37.441339523448	3.48000000e-005		
13					46.025197225412	3.48000000e-005		
14					46.025197225412	3.48000000e-005		
15					55.853877187705	3.48000000e-005		
16					55.853877187705	3.48000000e-005		
17					68.181299243207	3.48000000e-005		
18					68.181299243207	3.48000000e-005		
19					68.905115227988	3.48000000e-005		
20					68.905115227988	3.48000000e-005		
21					73.480375318181	3.48000000e-005		
22					73.480375318181	3.48000000e-005		
23					82.265438082508	3.48000000e-005		
24					82.265438082508	3.48000000e-005		
25					85.9267825833	3.48000000e-005		
26					85.9267825833	3.48000000e-005		
27					88.547743948677	3.48000000e-005		
28					88.547743948677	3.48000000e-005		
29					95.93270823775	3.48000000e-005		
30					95.93270823775	3.48000000e-005		
31					98.224630082851	3.48000000e-005		
32					98.224630082851	3.48000000e-005		
33					108.54679680922	3.48000000e-005		
34					108.54679680922	3.48000000e-005		
94					111.846888888888	3.48000000e-005		

Run 3, Data Delay within the 3<sup>rd</sup> LAN





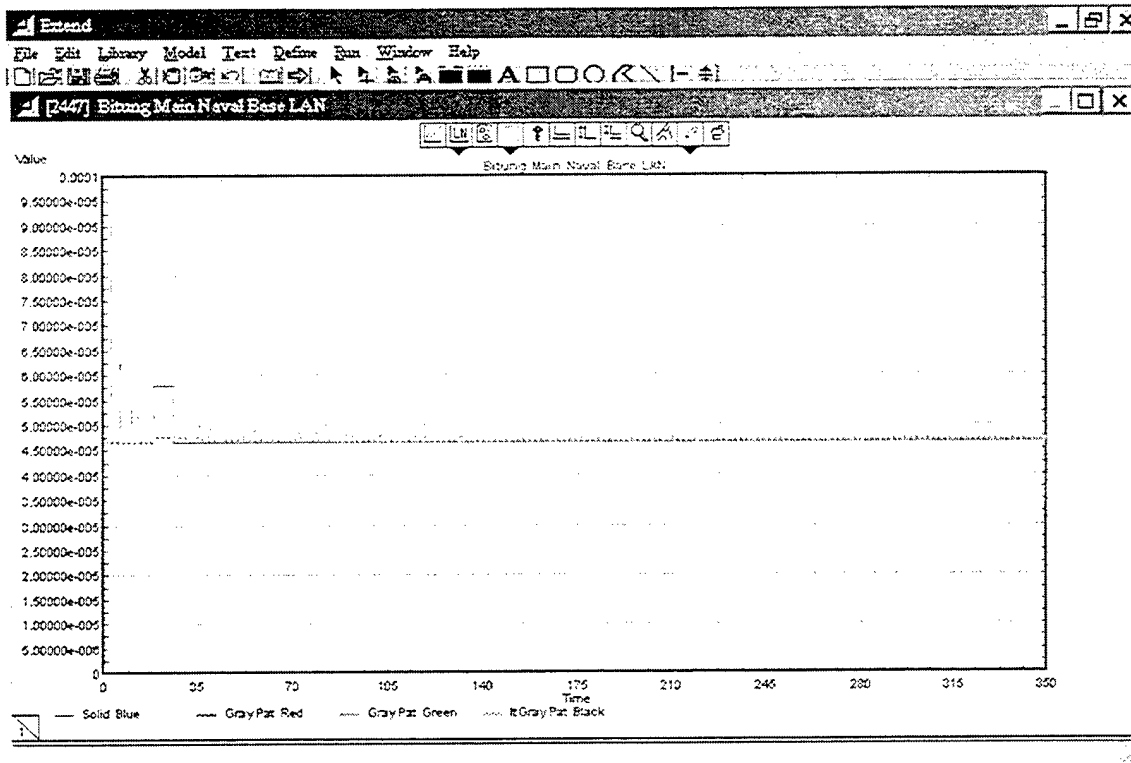
Run 3, the 4<sup>th</sup> LAN

U. Pandang Main Naval Base LAN

Point Numbers	Time	1-Solid Bl...	2-GrayPat...
0	0.3837205	0.003280748399	0.3837205
1	1.4695478892551	5.8400000e-005	1.4695478892551
2	1.7353724	0.0126895772341	1.7353724
3	2.2918885753692	5.8400000e-005	2.2918885753692
4	3.5576795029955	5.8400000e-005	3.5576795029955
5	17.708686463207	0.018238070817	17.708686463207
6	22.244831288828	5.8400000e-005	22.244831288828
7	45.312024050842	0.0125215725397	45.312024050842
8	55.802955409927	5.8400000e-005	55.802955409927
9	107.1525211752	3.8190072475286	107.1525211752
10	107.90819990692	5.8400000e-005	107.90819990692
11	120.71290948086	0.0089582747925	120.71290948086
12	121.8459823295	5.8400000e-005	121.8459823295
13	152.82675211755	1.7885350383243	152.82675211755
14	166.01335341199	5.8400000e-005	166.01335341199
15	173.47135211755	1.7151379888984	173.47135211755
16	174.38952934622	5.8400000e-005	174.38952934622
17	183.1852868422	1.8890031781719	183.1852868422
18	184.31612918915	5.8400000e-005	184.31612918915
19	190.8094006556	0.0135804780587	190.8094006556
20	190.82554053528	5.8400000e-005	190.82554053528
21	265.20871385522	6.83197465e-005	265.20871385522
22	267.92433317756	5.8400000e-005	267.92433317756
23	330	5.8400000e-005	330
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			

311.4 0.53561

Run 3, Data Delay within the 4<sup>th</sup> LAN

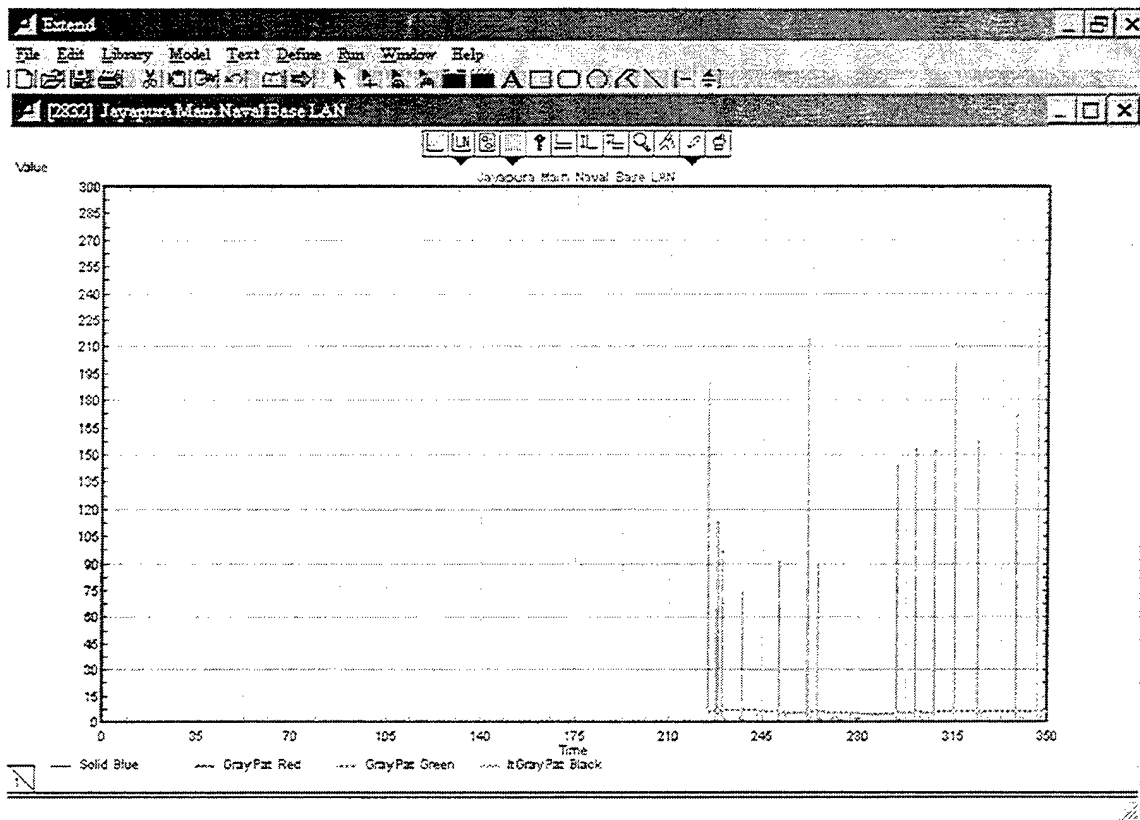


Run 3, the 5<sup>th</sup> LAN

Port Number	Time	1 - Solid Bl	2 - GrayPat	3 - Time	3 - GrayPat	4 - Time	4 - HGrayPa...
0	2.2529575383161	4.65000000e-005		2.2529575383161	4.65000000e-005		
1	8.89924772584	4.65000000e-005		3.1588751024627	6.32000000e-005		
2	19.280421778928	5.78185460e-005		3.1588751024627	6.65000000e-005		
3	29.580347795163	4.65000000e-005		5.6249440153062	6.99000000e-005		
4	32.00524001118	4.65000000e-005		5.6249440153062	6.85000000e-005		
5	64.582619234981	4.65000000e-005		6.9294491612375	6.21000000e-005		
6	101.47552711289	4.65000000e-005		6.9294491612375	6.65000000e-005		
7	262.8822273548	4.65000000e-005		8.89924772584	5.82500000e-005		
8	350	4.65000000e-005		8.89924772584	4.65000000e-005		
9				10.403585269911	5.29200000e-005		
10				10.403585269911	4.65000000e-005		
11				10.465618976135	5.43666667e-005		
12				10.465618976135	4.65000000e-005		
13				11.153404948504	5.32571429e-005		
14				11.153404948504	4.65000000e-005		
15				12.821643767126	5.24250000e-005		
16				12.821643767126	4.65000000e-005		
17				12.849294480213	5.17777778e-005		
18				12.849294480213	4.65000000e-005		
19				13.605931852047	5.12600000e-005		
20				13.605931852047	4.65000000e-005		
21				19.280421778928	5.18562017e-005		
22				19.280421778928	4.75348781e-005		
23				26.580347795163	5.14182124e-005		
24				26.580347795163	4.74822653e-005		
25				26.819233570828	5.10475307e-005		
26				26.819233570828	4.74013240e-005		
27				28.74726344835	5.07298964e-005		
28				28.74726344835	4.73479032e-005		
29				30.110831870188	5.04640692e-005		
30				30.110831870188	4.73011592e-005		
31				32.00524001118	5.02128592e-005		
32				32.00524001118	4.72599146e-005		
33				32.147512603093	5.00610911e-005		
34				32.147512603093	4.72325272e-005		

Run 3, Data Delay within the 5<sup>th</sup> LAN





Run 3, the 6<sup>th</sup> LAN

Extend

File Edit Library Model Text Define Run Window Help

[2332] Jayapura Main Naval Base LAN

Point Number	Time	1. Solid Bl...	2. Time	2. GrayPat...	3. Time	3. GrayPat...	4. Time	4. ItGrayPa...
0	0.2258101964889	4.66000000e-005			0.2258101964889	4.66000000e-005		
1	5.5515353268485	4.66000000e-005			0.7594111339852	9.32000000e-005		
2	11.193670685426	4.66000000e-005			0.7594111339852	4.66000000e-005		
3	17.591101476259	4.66000000e-005			5.5515353268485	9.66000000e-005		
4	33.412574813637	4.66000000e-005			5.5515353268485	4.66000000e-005		
5	65.382258105424	4.66000000e-005			5.5515353268485	4.66000000e-005		
6	129.54551844073	4.66000000e-005			5.129719990018	8.21033333e-005		
7	159.10811954679	0.0023898			5.129719990018	4.66000000e-005		
8	171.02995942748	4.66000000e-005			7.9740792484377	5.32500000e-005		
9	224.55309821504	0.8724675179639			7.5740792484377	4.66000000e-005		
10	224.55309821504	0.8499786102162			11.193670685426	5.59200000e-005		
11	224.55309821504	1.3257305102093			11.193670685426	4.66000000e-005		
12	224.55309821504	35.25106311278			12.280424448882	5.43688867e-005		
13	224.55309821504	0.8465712414623			12.280424448882	4.66000000e-005		
14	224.55309821504	35.267126342311			14.742958759131	5.32571428e-005		
15	224.55309821504	0.7955253438257			14.742958759131	4.66000000e-005		
16	224.55309821504	0.7324651076122			17.591101476259	5.24250000e-005		
17	224.55309821504	0.8215805194484			17.591101476259	4.66000000e-005		
18	224.55309821504	0.7114302918468			25.742372585857	5.17777778e-005		
19	224.55309821504	0.8738100028555			25.742372585857	4.66000000e-005		
20	224.55309821504	0.577846772834			32.412574813637	5.12600000e-005		
21	224.55309821504	58.32510180602			32.412574813637	4.66000000e-005		
22	224.55309821504	69.2882440019			40.178233292636	5.08385336e-005		
23	224.55309821504	44.959687746238			40.178233292636	4.66000000e-005		
24	224.55309821504	104.68405781542			43.655124116268	5.04833333e-005		
25	224.55309821504	189.40689159044			43.655124116268	4.66000000e-005		
26	224.55309821504	0.3467746785373			45.022846327489	5.01849154e-005		
27	224.55309821504	103.17609291231			45.022846327489	4.66000000e-005		
28	224.55309821504	0.2374806712568			46.77859268121	4.99285714e-005		
29	224.55309821504	0.052299244111			46.77859268121	4.66000000e-005		
30	224.55309821504	0.0186174828048			46.77859268121	4.66000000e-005		
31	224.55309821504	0.580944895635			46.77859268121	4.66000000e-005		
32	224.55309821504	0.0273896			46.77859268121	4.66000000e-005		
33	224.54584342138	0.5150034924411			46.77859268121	4.66000000e-005		
34	224.54584342138	0.708871778776			46.77859268121	4.66000000e-005		
35	224.54584342138	0.775777777778			46.77859268121	4.66000000e-005		

Run 3, Data Delay within the 6<sup>th</sup> LAN

Extend									
File Edit Library Model Text Define Run Window Help									
[2832] Jayapura Main Naval Base LAN									
Point Number	Time	1 - Solid B...	2 - Time	3 - GravPat	4 - Time	5 - GravPat	6 - Time	7 - GravPat	8 - Time
36	224.94684042508	0.3032896995			51.848842820528	4.85000000e-005			
37	224.94684042508	0.3032896995			52.1544424618825	4.85000000e-005			
38	224.94684042508	0.3032896995			52.1544424618825	4.85000000e-005			
39	224.94684042508	0.3032896995			55.401265984652	4.85000000e-005			
40	224.94684042508	0.3032896995			55.401265984652	4.85000000e-005			
41	224.94684042508	0.3032896995			55.982120946532	4.85000000e-005			
42	224.94684042508	0.3032896995			55.982120946532	4.85000000e-005			
43	224.94684042508	0.3032896995			57.170655832948	4.85000000e-005			
44	224.94684042508	0.3032896995			57.170655832948	4.85000000e-005			
45	224.94684042508	0.3032896995			57.260917624608	4.85000000e-005			
46	224.94684042508	0.3032896995			57.260917624608	4.85000000e-005			
47	227.66052988516	2.2647446510754			57.879576585904	4.85000000e-005			
48	227.66052988516	2.2647446510754			57.879576585904	4.85000000e-005			
49	227.66052988516	2.2647446510754			62.654151967204	4.85000000e-005			
50	227.66052988516	2.2647446510754			62.654151967204	4.85000000e-005			
51	227.66052988516	2.2647446510754			65.382258105424	4.85000000e-005			
52	227.66052988516	2.2647446510754			65.382258105424	4.85000000e-005			
53	227.66052988516	2.2647446510754			66.428398470396	4.85000000e-005			
54	227.66052988516	2.2647446510754			66.428398470396	4.85000000e-005			
55	227.66052988516	2.2647446510754			70.30630522943	4.85000000e-005			
56	227.66052988516	2.2647446510754			70.30630522943	4.85000000e-005			
57	227.66052988516	2.2647446510754			71.962423463518	4.85000000e-005			
58	227.66052988516	2.2647446510754			71.962423463518	4.85000000e-005			
59	227.66052988516	2.2647446510754			75.544482313209	4.85000000e-005			
60	227.66052988516	2.2647446510754			75.544482313209	4.85000000e-005			
61	227.66052988516	2.2647446510754			76.99508606725	4.85000000e-005			
62	227.66052988516	2.2647446510754			76.99508606725	4.85000000e-005			
63	227.66052988516	2.2647446510754			80.622954717875	4.85000000e-005			
64	227.66052988516	2.2647446510754			80.622954717875	4.85000000e-005			
65	227.66052988516	2.2647446510754			82.467814944084	4.85000000e-005			
66	227.66052988516	2.2647446510754			82.467814944084	4.85000000e-005			
67	227.66052988516	2.2647446510754			85.021296802258	4.85000000e-005			
68	227.66052988516	2.2647446510754			85.021296802258	4.85000000e-005			
69	227.66052988516	2.2647446510754			88.319432428731	4.85000000e-005			
70	227.66052988516	2.2647446510754			88.319432428731	4.85000000e-005			

Extend									
File Edit Library Model Text Define Run Window Help									
[2832] Jayapura Main Naval Base LAN									
Point Number	Time	1 - Solid B...	2 - Time	3 - GravPat	4 - Time	5 - GravPat	6 - Time	7 - GravPat	8 - Time
71	227.66052988516	2.2647446510754			91.533638394461	4.79944444e-005			
72	227.66052988516	2.2647446510754			91.533638394461	4.79944444e-005			
73	227.66052988516	2.2647446510754			92.058246758696	4.79944444e-005			
74	227.66052988516	2.2647446510754			92.058246758696	4.79944444e-005			
75	227.66052988516	2.2647446510754			93.115632369474	4.79944444e-005			
76	227.66052988516	2.2647446510754			93.115632369474	4.79944444e-005			
77	227.66052988516	2.2647446510754			94.451478444631	4.77944444e-005			
78	227.66052988516	2.2647446510754			94.451478444631	4.77944444e-005			
79	227.66052988516	2.2647446510754			94.929419319501	4.77944444e-005			
80	227.66052988516	2.2647446510754			94.929419319501	4.77944444e-005			
81	227.66052988516	2.2647446510754			95.099356492251	4.77944444e-005			
82	227.66052988516	2.2647446510754			95.099356492251	4.77944444e-005			
83	227.66052988516	2.2647446510754			96.361314469353	4.77944444e-005			
84	227.66052988516	2.2647446510754			96.361314469353	4.77944444e-005			
85	228.63136546294	0.6708522844644			98.568712007762	4.76827209e-005			
86	228.63136546294	0.6708522844644			98.568712007762	4.76827209e-005			
87	228.63136546294	0.6708522844644			102.45073239407	4.78590909e-005			
88	228.63136546294	0.6708522844644			102.45073239407	4.78590909e-005			
89	228.63136546294	0.6708522844644			114.8227635863	4.76355569e-005			
90	228.63136546294	0.6708522844644			114.8227635863	4.76355569e-005			
91	228.63136546294	0.6708522844644			114.9542065863	4.76130425e-005			
92	228.63136546294	0.6708522844644			114.9542065863	4.76130425e-005			
93	228.63136546294	0.6708522844644			117.03585087488	4.75914894e-005			
94	228.63136546294	0.6708522844644			117.03585087488	4.75914894e-005			
95	228.63136546294	0.6708522844644			122.8008385043	4.75789332e-005			
96	228.63136546294	0.6708522844644			122.8008385043	4.75789332e-005			
97	228.63136546294	0.6708522844644			125.3080383811	4.75510204e-005			
98	228.63136546294	0.6708522844644			125.3080383811	4.75510204e-005			
99	228.63136546294	0.6708522844644			125.8048342738	4.75320000e-005			
100	228.63136546294	0.6708522844644			125.8048342738	4.75320000e-005			
101	228.63136546294	0.6708522844644			129.54651944073	4.75157255e-005			
102	228.63136546294	0.6708522844644			129.54651944073	4.75157255e-005			
103	230.21466533688	1.371008167112			129.5471753277	4.74951538e-005			
104	230.21466533688	1.371008167112			129.5471753277	4.74951538e-005			
105	230.21466533688	1.371008167112			146.89046061453	4.74792463e-005			

Extend									
File Edit Library Model Text Define Run Window Help									
[2332] Jayapura Main Naval Base LAN									
Point Number	1-Time	1-Solid Bl	2-Time	2-GravPat	3-Time	3-GravPat	4-Time	4-GravPa	
1991	346.21104534605	158.1149859961			279.99678910751	4.6373491526877			
1992	346.21104534605	182.35041215129			279.99678910751	4.63318802777302			
1993	346.21104534605	2.0810807851146			279.99678910751	4.6285362325216			
1994	346.21104534605	1.9940685520106			279.99678910751	4.6228937588982			
1995	346.21104534605	158.10953844001			279.99678910751	4.6192606088092			
1996	346.21104534605	1.9843395878008			279.99678910751	4.6146367240159			
1997	346.21104534605	2.1737564343858			279.99678910751	4.6146367709625			
1998	346.21104534605	1.7607274780268			279.99678910751	4.6100221041215			
1999	346.21104534605	1.7758146371234			279.57282048021	4.6110083235621			
2000	346.21104534605	1.6119988018699			279.57282048021	4.6125680326022			
2001	346.21104534605	1.5803933308206			279.57282048021	4.611408217972			
2002	346.21104534605	1.3808802547836			279.57282048021	4.6140144124151			
2003	346.21104534605	1.1323031245123			279.57282048021	4.6144628288728			
2004	346.21104534605	1.0224078924057			279.57282048021	4.6144603797873			
2005	346.21104534605	1.68.01070812223			279.57282048021	4.6152443871303			
2006	346.21104534605	1.3026322761718			279.57282048021	4.6154479973363			
2007	346.21104534605	0.9345655885057			279.57282048021	4.6157456330883			
2008	346.21104534605	0.955544343486			279.57282048021	4.6169224156059			
2009	346.21104534605	1.7080901790889			279.57282048021	4.6178702920834			
2010	346.21104534605	1.4074819734854			279.57282048021	4.6171828416273			
2011	346.21104534605	0.8384620368544			279.57282048021	4.6172840423482			
2012	346.21104534605	1.8703259897141			279.57282048021	4.61729958285			
2013	346.21104534605	0.8425962964698			279.57282048021	4.612687271014			
2014	346.21104534605	0.8865239605161			279.57282048021	4.6080837907036			
2015	346.21104534605	0.8318024826262			279.57282048021	4.60348948893155			
2016	346.21104534605	0.75532073438			279.57282048021	4.6089043408212			
2017	346.21104534605	0.7588050537612			279.57282048021	4.6043283187015			
2018	346.21104534605	1.55.93538422144			279.57282048021	4.6097813890463			
2019	346.21104534605	0.4426655716126			279.57282048021	4.605203535501			
2020	346.21104534605	0.46359713481903			279.57282048021	4.6005547265208			
2021	346.21104534605	0.3918887870748			279.57282048021	4.6761148239682			
2022	346.21104534605	0.7412875428622			279.57282048021	4.6715841171138			
2023	346.21104534605	0.437588354353			279.57282048021	4.6670622732789			
2024	346.21104534605	0.8949341778735			279.57282048021	4.662548388942			
2025	346.21104534605	0.3348322712486			279.57282048021	4.5580453684046			
2026	346.21104534605	0.3348322712486			279.57282048021	4.5580453684046			

Extend									
File Edit Library Model Text Define Run Window Help									
[2332] Jayapura Main Naval Base LAN									
Point Number	1-Time	1-Solid Bl	2-Time	2-GravPat	3-Time	3-GravPat	4-Time	4-GravPa	
2026	346.21104534605	0.3348322712486			279.57282048021	4.5535502547189			
2027	346.21104534605	0.2051468003158			279.57282048021	4.5535503087556			
2028	346.21104534605	0.20932715186519			279.57282048021	4.5480640442218			
2029	346.21104534605	4.68000000e-005			279.8202448653	4.5491995758552			
2030	346.27894848381	0.1558701891038			279.8202448653	4.5493139260161			
2031	346.27894848381	4.68000000e-005			279.8202448653	4.5494084862685			
2032	346.02127921136	1.7100614824802			279.8202448653	4.5494957215752			
2033	346.02127921136	2.1828105789641			279.8202448653	4.5495456595858			
2034	346.02127921136	1.4947208754544			279.8202448653	4.5496878003581			
2035	346.02127921136	1.47899675104674			279.8202448653	4.5496878003581			
2036	346.02127921136	1.4932884833293			279.8202448653	4.5501383940706			
2037	346.02127921136	1.8358841303821			279.8202448653	4.5518888252923			
2038	346.02127921136	1.3550175460236			279.8202448653	4.5272440506026			
2039	346.02127921136	1.1822893188809			279.8202448653	4.5272440507489			
2040	346.02127921136	1.0562100277248			279.8202448653	4.522809823373			
2041	346.02127921136	1.8783818246032			281.17536780975	4.5241240381588			
2042	346.02127921136	1.0221276842847			281.17536780975	4.5254089806129			
2043	346.02127921136	0.942814550135			281.17536780975	4.5284688950088			
2044	346.02127921136	0.8985801465737			281.17536780975	4.5274714365548			
2045	346.02127921136	0.9138507078517			281.17536780975	4.52888463301881			
2046	346.02127921136	1.0527782388498			281.17536780975	4.52674732144993			
2047	346.02127921136	0.8213273489055			281.17536780975	4.530684832879			
2048	346.02127921136	0.901715409778			281.17536780975	4.5314776368787			
2049	346.02127921136	0.5544662871241			281.17536780975	4.5324848114075			
2050	346.02127921136	0.359588089585			281.17536780975	4.5331519307787			
2051	346.02127921136	0.3182187929405			281.17536780975	4.5340992462273			
2052	346.02127921136	0.3071654925716			281.17536780975	4.5345728944884			
2053	346.02127921136	0.2371296109185			281.17536780975	4.5353199305199			
2054	346.02127921136	0.2385183156425			281.17536780975	4.5357652858422			
2055	346.02127921136	0.2215857767878			281.17536780975	4.5367310303778			
2056	346.02127921136	0.0762076803327			281.17536780975	4.5371380385402			
2057	346.02127921136	0.051892553225			281.17536780975	4.5374751728902			
2058	346.02127921136	4.68000000e-005			281.17536780975	4.5378204226485			
2059	350	4.68000000e-005			281.17536780975	4.5381089242973			
2060					281.17536780975	4.5385741085483			
2061					281.17536780975	4.5390075162918			

Run 3, Data Delay within the 6<sup>th</sup> LAN

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